Pathology Lectures Winter Term.
(1907)

INFLAMMATIONS.

This is particularly difficult to define because the process includ es so many elements, each subject to modifications which include various disturbances of the circulation; regressive changes of more than one kind, progressive changes, also caused by many stimuli and having many endings. From the earliest writers it is customary to describe it in this way:- Rubor= the part is red from Hydremia (2) Tumor= excess of blood and lymph in the part (3)Calor= part is red and hot from the ex- cess of blood and lymph; (4) Dolor= Pain, stetching of nerve filaments; and there is possibly another (5) Functionless= Function suffers. These are only symptoms and are not necessary to the process.

Inflammation is the reparative reaction of a tissue to an injury.

Causes:- Some are simply mechanical.
" " Thermal.
" " Electrical (X-ray).
" " Chemical.
" " Bacterial.

These may act by themselves or with other influences. Bacteria act especially with other factors or we could not explain why so many escape inflammatory when so constantly surrounded by bacteria. These additional causes are predisposing, contributing, or exciting, and may determine both the kind and the degree of the inflammation. Slight wounds, ex- posure to cold and disposition of the patient are frequent examples. In general we can sum the causes as:- ~~Pyonetic~~, Toxic, and infective.

The different causes acting singly may produce constant results, then the burn of a hot iron, a strong acid and the local effect of bacteria are characteristic.

Inflammation due to mechanical violence, heat and cold, electricity, and chemicals is seldom found by suppuration unless infected later. Caus ed by bacteria it is frequently suppurative, though some forms as ~~tumor~~ bacilli are seldom pyogenic. Strong Ammoniam silver nitrate, turpentine, and some others cause non-bacterial suppuration but this is experiment- al and differs from ~~faecal~~ suppuration in being localized, causing no metastasis, the pus is in proportion to the amount ofirritant and to all its reactions and lastly the product injected into the animal is not pyogenic. In general bacteria cause self ~~purportrating~~ suppurative in- flammation and others cause limited and ~~[illegible]~~ inflammation.

(1).The bacteria in inflammation first enter through the natural chan- nels like the alimentary, respiratory, or genito-urinary. They are not strictly within the body although in a mucous canal until they pass thro a basement membrane. Previous inflammation or a general lessened res- istence favor the multiplication of germs thus entering the body, and they usually die unless such conditions are present.

(2). They enter through wounds, large or microscopic. These open lymph and blood channels and permit the action of bacteria locally and at a distance.

(3)They enter through the unbroken skin, by the natural openings of the sweat, sebaceous, and hair follicles. Boils and carbuncles develope in this way and there may be crop after crop in patients weakened by disease like typhoid. Similarly they enter through the mucosa by gland openings and lymphoid areas.

(4) There is a special case of passage through the skin by insect bites, thus egyptian Opthalmus. these bacteria are carried by flies and they destroy the sight of 3% of the patients attacked.

(5). There is occasionally infection without the wounds of the sur- face, that is Cryptogenic, as in tetanus in the new born was once thought to be the case.

Infection is modified by eight factors:- (1) Virulence of the organ- ism. There is much variation between the bacteria and the strains of the same kind, as, damage done by ~~anthrax~~ is seldom so extensive as that done by the streptococcus, further there is often a great increase in the viru lence in passing from one wound to another, as with the colon bacillus and erysipelas.

(2) Amount introduced. Thus one or two anthrax bacilli are fatal to a rabbit. Most all humans can take care of a few tubercular bacilli at a time; some cases seem to be due to infection by a large number at a time.

(3) Mixed infection. Bacteria seldom occur alone in nature. When living together = Symbiosms, and either increase or decrease in virulence, e.g. injection of erysiphelas and anthrax is almost harmless, but pneumococcus and anthrax is very severe. Clinically we see it worst in cases of small pox, scarlet, and dyptheria, if there is added a streptococcus infection.

(4) Heredi ty. and predisposition. These are very day experiences. Of three men exposed one escapes, one is slightly locally infected, one is severely generally infected. There is a difference between races, individuals of the same race, and man and animals. Man is more susceptible to pus orgamisms than animals.

(5) Local disposition. Local anemia or hyperemi may either prevent or favor infection. The same is true of foreign bodies, retained secretions, nervous influences etc.

(6) Preexistence of disease. This is a very important factor. Patients often do not die of the disease of which they are said to suffer but from an intercurring infection. Many diseases are of terminal infection, thus diabetes disposes pneumonia, consumption, and gangrene of the lung.

(7) Habit and environment. The rat is immuned to anthrax on a meat diet, while on bread it takes it. Hunger makes the pigeon susceptible. Thirst and fatigue are the same. A rabbit injected with tubercle bacilli and kept in the dark will die while if kept in the light will live.

(8) Foetal transmission. This is of limited application. If from the father = Spermogenous; If from the mother = Oogenous; If from the placenta = Plakogenous. The placenta is usually a good filter, but syphilis, consumption, small pox, and measles are know to have been transmitted to the foetus.

Action of bacteria. To a veru slight extent it may be mechanical, as by plugging of loopes of the renal glommerruli. For general and important are the poisonous effects of bacterial products of cells and fluids of the body. This is the injuy required by our definition. The poisons vary in quality, composition and conditions under which they are produced. They are commonly given as four:- Ptomain; Leocomain; Toxabbumen. Toxin.

(1) Ptomain. It is an alkaloid produced by the non-pathogenic bact. from dead proteid material. The bacteria may be destroyed by heat, and the ptomain are unaffected, so that cooked meat still produces fatal poisoning, if the bacteria have filled it with ptomain. many cases come from sausage, fish, ice cream etc. and the general term Botulinism is given to this condition.

(2) Leucomain is an alkaloid produced by pathogenics from living tissues. Both of these are crystalyzable and from salts with acids.

(3). Toxins are from the proteids of living tissues by pathogenics are non-crystalyzable and do not form salts.

(4) Toxalbumins. These are poisons from the pathogenics and not from the tissues. They are specific in charateristics and effects, and perculiar to each kind of microorganism. They may formed both in living tissues and in artificial media, even in non-albumin media. They loose their properties at 58 degree C., they are very powerful in small doses per kilo per body weight. They may not act immediately after injection but after hours, Hence we conclude that they are enzy mes. The first three when injected make the animal sick, but do not reproduce the symptoms of disease. The toxalbumins when injected cause symptoms like clinical disease perculiar to the form used.

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Of all bacterial poisons Toxalbumens are the most important because they are produced in disease. Bacterial infection is hence due to the effects upon the cells and fluids of the body caused by the poisonous products of the germs. The chief elements in this chemical action are followed by:- degenerative changes in the cells; changes in the circulation; and later efforts at repair. The view that bacteria take for their own nourishment material needed by the body is unimportant. When these poisons are absorbed and carried thro the body by the blood and lymph they cause profound constitutional effects known as Toxemia. If the altered tissue eleme nts of necrosis are absorbed this is called ~~sapremia~~.sapremia, a term very little used at present. If bacteria themselves enter the blood current it may be temporary and cause metastasis at a distance or more permanent with a general infection of the blood called bacteremia.

Secondary infection occurs when one form prepares the way for anothe r either by making a local lesion which permits the entrance of the second form or by causing a general weakened resistance, e.g. frequently tuberculosis of the lung is the primary infection with pus infection later, which makes the chinical symptoms worse. There may even be three or four infectionse.g.first,a case of measles, second may have pneumonia third, followed by consumption of the lung, fourth, pus infection added to that, and a gangrene would be a fifth.

Stages of the process:- With a complete typical exudative inflammation we have the following groups of effects:-

1. Apteration in the structure of the tissue cells.
2. Alteration in the structure of the local vessels.
3. Alterations in the relation between the circulation of blood and the vessles containing it.
4. Secondary degeneration of cells.
5. Reparative proliferation which is the purpose of the whole process.

Any one of these stages may be lacking. The degree to which each developes may determine the variety of the inflammation present.

1.Discussed. This is the initial injury almost always present. The cells may be crushed or torn in two, or cleanly divided by mechanical means, or heat or cold or electric and chemical agents may coagulate their fluids or other wise injure them. In suppuration the death ofthe cells is both very marked and very extensive , either as a well defined focus or as an indetermined ~~infection~~ infiltration. When the cause is violence the cells may die. This is not part of the inflammation proper tho it leads to it. At the same time among the dead cells we discover some with increased nutritive activity which swell and multiply and then rapidly degenerate. That is there is a possibility for the cells, either the force or the chemical action may produce th eir death at once or they may be injured and undergo a seriese of degenerative changes and then die. In a simple inflammation the primary degeneration may not be very well marked, but in a severe case it may be the chief [illegible] feature. Almost all forms of degeneration are observed with the acute inflammation, cloudy, fatty, and hydropic are common; with the more chronic forms Hyaline, Mucoid, and Amyloid. In tissues which at their maturity are made up of distinct cell groups the more specialized cells some times return to a lower type of existence. Thus in voluntary muscle the nuclei may proliferate, take on protoplasm, and become to be independent. This is a loss of specialized characters on the part of the whole cell complex, and a reversion to a lower type. All these dgenerations cause partial or complete loss of function and in time death of the tissue. The fate of the dead part depends upon its situation, the nature of the irritant, and the intensity of its action. From a free surfacr the dead part is cast off. In the presence of many leucocytes the part is digested and dissolved and peptones and albumose appear in the urine. With a large destruction, solution and absorption may be incomplete and in the fatty mass remaining calcium salts deposite. A special case is a necrosis caused by tubercular bacilli where the dead tissue is seldom removed but dies and becomes caseous. In a Syphilitic lesion of some degeneration there is usually less fatty change and more of the fibrous elements

prsist. While the cells are dying the intercellular substance becomes mucoid or its fibers swell and disappear, elastic tissue going last. With chronic inflammation Hyaline and Amyloid affect the connective tissue, especially the subendothelia of the small vesse ls.

The reaction to the injury. This considered as. (a) In a non-vascular tissue, and (b) in a vascular tissue.

(a) The simplest case is seen in the one celled orgainsms. Here the animal go on living if the nucleus is not too badly injured. The same is true of the cells in the higher animals. In multicellular animals there is a division of labor , and certain wandering cells derived from the mesoderm, have the special function of sur rounding the ir ritant and this is called Chemotaxis, or Cytotaxis, either positiveor negative. It is positive when the cells are attracted, negative when they are repulsed by the irritant, and sometimes the negative may be converted into the positive, thus the tubercle bacilli is not positive ly cytotatic to polynuclear leucocytes. In this reaction the changes in the vessels are secondary, the migration and collection of the white cells are the most important feature, and this is defensive. In a nonvascular tissue like the cornea the only vessels are the delicate lymph channels, application of an irritant like zinc chloride or silver nitrate destroys the fixed cells at the point of application and causes swelling and later multiplication of neighboring ones. If the injury is more severe the small lymphocytes gather, with a worse injury like the injection of pus coccus the germ first multiplies and within 24 hours polynuslears come along the lymph spaces and pack themselves about the focus. This prevents the germs from entering the lymph channe ls any futther, and the covering cells break down and there is a small ulcer. Later the fixed cells proliferate and repair the damage.

(b) Reaction to an injury in a vascular tissue. This may take any one of seven forms;-

1. With a slight reaction, healing by primary union. With a steril knife cleanly divide the hypoderm and epiderm without wounding the large vessels and with the edges of the wound brought together. Within 24 hours there is a firm adhesion and by studying parts of the wound from time to time we see that the reaction of the injury is limited almost entire ly to the fixed cells of the part. The capillaries are closed partly by pressure during the cut, partly by retraction so the re is no hemorrhage. Within an hour the edges of the wound are a little swollen and reddened, the slight exudation of plasma has coagu lated, and glued the sides together. Into this coagulum the uninjured cells nearest send projections so that by the end of the second day the unorganized coagulum has been partly replace d by processes from the ce lls. New capi llaries bud from the uninjured ones, the buds being first solid and then ope ned there are but few whitecells, and the repair has been accomplished by the fixed connective tissue cells. This is called primary union and is the surgeons ideal, the object of all his aseptic methods. It is almost never so complete or so successful in operations as it is in experimental wounds in the labratory.

2. Marked vascular reaction, healing by secondary union. With an injury of ~~mechanical~~ severity there is profound effect on the nervous medium, system. The vaso-motors produce first a contraction usually important then a dilation which lasts longer . With the first the flow of blood is more rapid, with the second the current is slow. With the di lation the axial stream is broken, ~~seen,~~ the current flows in with the red cells closely packed together then the y spread out and scatter. The white cells gather on the sticky endothelia of the vessels walls and this is known as margination. They then actively pass out, and some of the red cells pass out andaway and the is called diapodesis. These red cells may be scanty or with severe infection very numerous. During life there is always some escape of some of the blood's fluid part reentering the capillaries, part returning by the lymphatics. When the balance between the escape of the fluid and its removal is disturbed the fluid accumulates and we have the inflammator y oedema which i always part of an exudative ~~xxxxx~~ inflammation. This is called an exudate and occurs both before and with and after the escape os the cells. The endothelia normally have a selective action, for the fluid outside of the vessels is not the entire plasma. But they may loose this function in inflammation.

These vascular changes hide the reaction of the fixed cells. As this stage passes away their part becomes clear in repair. Proliferation of the cells, formation of new capillaries, formation of fibers and condensation of the new tissue are the various steps. This is the process in wounds where profuse exudate prevents primary union. Healing begins after the discharge ceases, usually at the bottom of the wound and proceeding upwards. In aseptic wounds this period of discharge may be so short that cohesion of the sides and pratically a primary union occur. But if the sides of the wound are held apart healing takes plae e by the much slower process called granulation.

III. 1-11-07.

(5)Severe vascular reaction with suppuration. When pus organisms gain entrance and conditions favor their multiplication we have the most intense grade of inflammation called suppuration. Within four hours the vessles becomes filled with corpuscles, most of the leucos show margination, and a few have passed out of the vessels. At first they are chiefly large monos, later they are polys almost entirely. The connective cells swell to a round shape, cocci are found in the lymph spaces, part free, part inclosed in fixed cells, and part in leucocytes By the end of 10 hours all these changes are more marked. The white cells are chiefly polys and the monos have moved away from the germs. Red cells may be mixed with the others and the exudate is copious. If on a surface there is a free discharge of pus and fluid together with loosened and proliferated investing cells, and the altered secretions of any glands which may be present, as mucus. If deep in the tissue the exudate cannot escape. By its pressure and chemical action its tends to cause the death of more cells also lessens the supply of blood to the part. The process may stop here and end in complete recovery. The fluids are then absorbed, the cells liquify and removed. A good example of such recovery is croupous pneumonia. This process is called resolution and depends upon the integrity of the lymph system in the part.

4. Healing by granulation. The edges of the wound which is the seat of the suppuration cannot be held in apposition. There is more or less retraction or gaping and hence a cavity which has to be filled after the discharge ceases. This is accomplished by granulation tissue and is very slow. In clean experimental wounds it begins about the 10th day. It is the work of the fixed connective tissue cells especially of two varieties:- (1) The fibroblasts multiply, become large and epitheliod, with pale nuclei and loose their processes, and at the same time the capillaries send out a great number of new loopes or arches without lumena. These project slightly from the surface and each makes a small granule; each granule has a covering of cells derived from the fibroblasts and carries a capillary loop with many new cells packed about it A seriese of such arches carries connective tissue and vessels to the top of the wound. And as the new arches form the old ones are developing lumena. The next step is a return of the fibroblasts to a more mature condition after the defect in the tissue has been filled, and the skin or mucosa is beginning to grow over it from the sides. Many of these new cells disappear and fibers develope in what was only rich cellular tissue. The fibers start from each end of the fibroblasts and it becomes more spindle shaped and also separates off from the sides, so that the cell grows both longer and narrower. Also the vessels decrease in number and the white cells wander away. Giant cells are present for a time at this stage, occupying the sight of the capillaries, because derived from their endothelia and having new cells disposed in rings about them.

Suppurative inflammation with necrosis. (a) With necrosis localized. An inflammation caused by bacteria and its exudate confined in the tissues destroyes some of the cells, and the local area of pus,and necrosis, and is called an abcess. At times there may be more death than suppuration, as in abcess of the liver. There is great influx of polys in response to the irritant and also a general increase in the blood, the latter is known as the inflammatory leucotocysis. Immigration of the white cells in the tissues stuffs the lymph spaces full and this acts with the serous infiltration to swell it, to compress its vessels, to

limit the size of the focus. With nutrition thus cut off the toxic matters act more rapidly and the tissue dies, and this toxic action may be so powerful that it occurs before the leucocytes gather and includes them later. The form of necrosis varies but is usually at first coagulation necrosis, and later liquifaction. As the central portion melts down we find on section of the part three distinct zones:- (1) a collection in the middle of dead semifluid material including broken down elements peculiar to the part, red and white cells , both dead, and countless bacteria, many of them also dead. (2) Outside of this a varying zone where infiltration with pus cells is extreme. This still takes stain, but feebly, showing that it is dead or dying. In this there are many bacteria most of them alive. (3) Outside of this a zone of severe hyperemia where both pus cells and bacteria are scarce, and the pus cocci are included in the pu and connective tissue cells and rendered harmless. Unless the pus is evacuated the tendency is for more tissue from zone #2 to melt down and thus the pus bouroughs. When opened the contents escape, the dead parts of the walls separate and are cast off, the exudation and hyperemia decrease, and granulation begins at the bottom and fills the defect. The collapse of the walls lessens the amount of repair needed. This healing is repair not regeneration, for scar tissue takes the place of higher cells which die. If not emptied the pus makes its way to the outside producing what is called a fistula, or opens into some body cavity, or hollow organ, or the fluid is absorbed, and the dead elements surrounded by a fibrous capsule, or filled with lime salts. In serous cavities and large abcesses the walls may go on discharging pus for a long time, they are found covered with a layer of fibrin and pus infiltrated with serum known as a pyogenic membrane, often partly organized.

Nature of pus. Gross appearance. This varies with the germ. With Staphelococcus it is dirty yellow or golden, thick, and with an odor like sour paste; with streptococcus it is thinner, whiter, often containing shreds of tissue; with the colon bacillus it is thin brownish, and has a ~~feeble~~ fecal odor, or is dirty white and has thick particles in it. With the bacillus lanceolatus it is thin, greenish, watery, and copious. With amoeba coli it is thick reddish brown, and sometimes streil, except for the amoeba. With the tubercle bacillus it is pasty or curdy, and whitish, containing caseous lumps, and if from bone sand or spicules also.

Histology of pus. (1)Polys are numerous, spherical & dead, with granules which clear up with acetic acid, they contain bacteria and ferments some are fatty or mucoid or contain glycogen. They are the vast majority present. (2)Monos, usually few and seen in earlier stages, they also contain bacteria which may still stain. They are most numerous in acute inflammation. (3) Embryonic forms of both leucos and fixed cells often grouped about the other elements. They break down early because unable to make tissue in the presence of bacterial toxins. (4) Fixed cells variously altered and dying. (5)endothelia, from lymph and blood vessels and serous membranes. (6) Fatty cells usually empty. The cells of the part which may help to make the diagnosis, as of liver, kidney etc. Also fibrin which does not belong to the pus, but may happen to occur. Also fibers both white and elastic, from the breaking down of tissue, and lastly bacteria, the commonest being pus organisms, but frequently many others especially if derived from an organ like the gut or lung.

Composition of pus, this includes the cells and elements already mentioned and also the liquor puris. Liquor Puris, this is usually alkaline but sometimes acid, with a sp. gr. of about 1050. This fluid contains water from 937 to 970 per 1000; salts 2 to 5 parts; including phosphates, sulphates, carbonates and NaCl; proteids especially serum albumin and serum globulin, albumose, peptone, ferments, ptomains, leucomains, fatty matters, as oil drops, or crystals of fatty acids, pigment from blood and bacteria and cholesterin.

Varieties of pus 1. Laudable= Healthy.
2. Sanious = Blood mixed.
3. Ichorous= Irritating.

Muco-pus, sero-pus, and cheesy- pus are named and also occur.

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Lecture IV. 1-16-07.

M.H.B.

(Inflammations continued.)

(6) Inflammation with diffuse necrosis. The bacteria furnish enzymes which coagulate fibrin, hence on a mucus surface the exudate will occur as a more or less adhesive layer. This consists of dead cells from the surface red blood cells which may be numerous, leucocytes chiefly pus cells, and altered mucus , all held together ny fibrillae, and called a coagulum. When only the surface or the outter part of the cells is involved the name croupous is applied; with more exudateand the tissue involved depply, like the whole depth of the whole columnar epithelium, the base membrane and perhaps below, it is called a diptheritic inflammation or diptheric. The name pseudo-membranous inflammation is also given to this form of inflammation. One case occurs in the lung with Lobad Pneumonia. Here the alvoeli are filled with an exudate which is held together by fibrin. In the tissue spaces of the skin with severe Erysiphelas another form occurs. These three organisms of Diptheria, Pneumonia, and Erysiphelas are the commonest causes of such inflammatimn The false membrane on a wound or a mucus surface may be in little scattered patches or in one sheet. It is tightly adherent because the fibrin is tangled among the cells which are not yet loosened, and because the membrane has little projections from its undersurface fitting into follicles or other openings. In color it may white, yellow, red, or greenish, in proportion to the pus and red cells present. When removed by force it leaves an ulcer which is shallow in croupous and much deeper in diptheritic form, hence the former may heal without a scar, but the latter especially when the basement membrane is destroyed heals by scar. After the removal of the false membrane there may be reformed a number of tissues. The fibrin appears in it in four forms:-1Either as slender threads; 2. as granules; 3. as hyaline masses or 4. in radiating clusters, or star shaped. Both hemmrrhage and suppuration may accompany inflammation of this type and conceals its characters in the groos. In the case of diptheric some of the worst clinical attacks are not accompained by the formation of a membrane.

(7) Inflammation with gangrene. The causes include extreme degrees of heat and cold, some peculiar central nervous diseases, infection of certain bacteria of special virulence, or infection with less toxic germs if resistence is low. Thus in sickly children a gangrene of the cheek some times occurs and is called Noma, especially in female children, and may also involve the external genitals. It is almost always faltal but if the child recovers the great destruction of the tissue makes large disfiguring scars. When chronic alcoholic patients have pneumonia, gangrene of the lung often complicates the lesion, and the same is true of diabetes. General infection with the bacteria of anthrax, malignat oedema, and bac. Aerogenes capsulatus is often accompanied by gangrenous lesions of the skin and internal organs, with the formation of gas bubbles in the tissues and constitutional depression. In almost all these cases the gangrene is of the moist variety. Gangrene cannot occur in a healthy tissue, necrosis preceeds it, and is of sufficient severity to permit the putrifactive germs to cause the gangrene The lesion is most common where access of the external air is possible.

CONSTITUTIONAL EFFECTS OF INFLAMMATION.

1. Aseptic wound fever. With a non-infected wound. When the violence destroyed large amounts of tissue, absorption of the altered tissue products may cause slight fever. This seldom lasts long, seldom goes above 1 or 2 degrees, is not gangerous, and is known as aseptic wound fever.

(2) Septicemia or sepsis. When the bacterial infection is favorable to the patient it is because the germs are confined to a limited focus, or if a few escape into the circulation they are at once destroyed. The wall of leucocytes which confines them locally may not be perfect or the vessels and lymphatics may take up their poisonous products. This happens especially with virulent infections and in patients with lowered resistence. The slight absorption of toxins which probably occurs with every inflammation is not called septicemia. If the general symptoms are well marked there is high temperature, ir regular in its course

from day to day, frequently with chills and exhausting sweats, the face is flushed and anxious, the mind confused, and headache, photofobia, stupor, delerium, show the severity of the toxic effect on the central nervous system. The patient is then said to be spptic, and the disease is called septicemia. On making cultures from the blood we seldom find bacteria unless we take large amounts of blood during a chill or soon after it. Just before death many bacteria ~~xxxyxbxstxxxx~~ may invade the blood but htis is a terminal infection because of the greatly lowered resistence and the germs are not those that caused the disease.

(3) If bacteria are in the blood and can be recovered from it in cultures it is called bacteremia. If they are pus germs they make capillary emboli especially in organs which excrete them, like the kidney and these form multiple abcesses. If there is a condition with many abcesses throughotu the body it is called pyemia. Here the joint cavities, the skin the serous cavities, and many organs may contain abcesses

Aseptic= with no germs.
Septic= " Toxins of germs.
Bacteremia= With germs and toxins.

One of the worst cases of the latter is streptococcus infection. These ~~xx~~ constitutional effects cannot be classed with the reparative part of inflammation, they belong to the destructive changes.

SUMMARY:- 1. Inflammatory reactions limited to fixed connective tissue cells.
2. Cellular reactions plus congestion of the vessels.
3. Cellular reaction, congestion plus exudate of serum and red blood cells.
4. Cellular reaction delayed, exudate excessive, chiefly consisting of polymuclears, the process is called suppuration.
5. Suppuration plus local necrosis = abcess formation.
6. Death of the tissue is the most prominent feature, croupous and diptheric types.
7. Early and rapid death of the tissue plus putrifaction= inflammation with gangrene.
8. Constitutional effects from the products of dead cells= aseptic wound fever; from production of bacteria in the blood = septicemia; from microorganisms in the blood = bacteremia; with multiple abcesses= pyemia.

CHIEF FACTORS IN INFLAMMATION:-

1. Vascular changes. The study of the different factors has been carried out experimentally, and we suppose that the experimental animals are enough like the humans to make their pathology applicable to him. The vascular changes occur in the higher animals but are not essential, for in animals without a vascular system there may be inflammation. In human pathology without changes in the vessels there can be no exudate. The first change is vaso constriction, which is active and temporary, there follows a partial dilation which is passive and lasts longer, and is accompanied by a more rapid current. Later the vessel walls relax further, the current is slowed, or may cease, and then thrombosis is liable to occur. Next there are changes in the vessel walls. These have something to do with the slowing of the current for the living endothelia swell and become more viscid, thus increasing the friction. The wall becomes more permeable, probably due to mechanical stretching of the cells and separation at their edges, and also due to changes in their nutrition. The thrombi may consist chiefly of altered blood plates, making the hyaline thrombi which cause focal necrosis, in large organs in some diseases or they may include all the elements of the blood. They easily become infected and thus send emboli to distant points which repeat the process. The thrombi may be of importance in leading to necrosis because they deprive the tissue of its nutrition.

Chief factors in inflammation continued.

2. The fluid exudate. As the vessels dilate the plasma begins to pass out into the tissues. The amount of this exudate depends upon the tissue affected, the state of health, and the nature of the irritant. The inflammatory oedema is often very copious as a rule in submucous, submucus, and subcutaneous tissues. Where the epithelium on a serous surface is but a single layer of flat cells but little exudate forms, and in denser tissues there may be almost none. Bacteria vary in their power to call out such serous exudate and as a rule a small amount means slight virulence, eempept in the case of tetanus. The function of the fluid exudate has been considered nutritive. But it is most abundant with virulent germs, and in oraly stages before repair begins. Its action is partly benificial, thus it dilutes the toxins, prevents their damaging the organs which secrete them, lessens the intensity of their poisonous action, It washes both the bacteria and toxins out of the tissues carrying them to some surface or canal or cavity. It prepares the bacteria for phagocytosis and the thing which does this is known as opsonin. If the exudate coagulates it may hold parts together and prevent or lessen the disturbance of anitomical and histological relations. Lastly the coagulum serves as a scaffold which supports the new cells and vessels while they are beginning to grow. The fluid exudate also has injurious effects:- it may wash toxins into the general system where they poison highly specialized cells, like those of nervous tissue; it may swell the inflammed tissue, causing such oedema as to interfere with function, as in the kidney, and the tension may compress both blood and lymph vessels, causing anemia or stasis. It may soak into cells, wash out their chromatin or even burst them; it stretches nerves by swelling causing pain; it may coagulate between the cells causing necrosis. If it collects in a serous cavity like the pleural it may compress and displace important organs; it may also drain the patients blood of fluid and raise the Sp. Gr. and favor thrombosis, as in Asiatic cholera; lastly it may aid in forming adhesions between serous surfaces resulting in false ligaments, which hinder the movements of visera or compress them. The normal and serous exudates are not the same fluid; the exudate contains a higher per centage of proteids and is more like the entire plasma; it contains also ferments, peptones, mucin, bacteria, cide elements, and bacterial products. It collects because of the action of the endothelia of vessels, dilation of capillaries, thinning of their walls and openings in their intercellular substance. Some of the proteids may comes from the dissolved glucocide.

Analysis of an inflammatory exudate:- (1) Average of three pleural cases (2) Hydrothrax.

Sp.GR.	%of proteids.	Fibrin.	Globulin.	Albumin.
1.021	4.587	0.0432	2.00	2.211
1.014	1.774	0.0006	0.63	1.15

The peptones and the fibrin vary inversely e.g., the more fibrin the more peptone. But in chronic abcesses there are enough peptones to be recognized in the urine. The fibrin is derived from the destruction of the white blood cells in the presence of lime salts in solution. The fibrin ferment acting on the fibrinogen and producing a calcium-nucleo-albumen. The fibrin is not copious on inflammed serous membranes forming after the investing endothelia have been cast off. But it may be found also on mucus sur faces, in tubular glands, in parenchymatous organs and connective tissue like the skin. On a serous surface its value is high by clothing the surface and stopping the mouths of the lymph stomata it prevents extension of the lesion. By forming adhesions it may limit the lesion to a small focus, as after perforation of the appendix. It may mechanically filter the bacteria out, forming on the pleura an abcess, [illegible] of the lung is not likely to follow plurilent pleurisy.

THE FERMENTS IN THE EXUDATE. and derived partly from the luccocytes, partly from bacteria and the later will act on proteids e.g., colatine, sugars, and fats, so that the dead tissue in a bacterial infection may be softened and removed by the ferments alone. Serum globulin in the exudate means a more severe inflammation than if the serum albumen alone is present for it is less diffusible. The fibrin, globulin, and

albumen may be wholly absorbed in healing but with many leucocytes pres ent there is often much mucin accumulating in the inflamed part which may hinder complete recovery and the return of the function. Partly on this account a suppurative inflammation is worse than a ser ous. The tissue which is the seat of the exudate is said to be cedematous. The fluid is found in its spaces absorbed by the cytoplasm and the nuclei of thecells and the latter causes Karyolysis and vacuole formation. Such a condition preceeds coagulation and liquifaction necrosis according as the ferment precipitates or digests the protedds.
CELLULAR EXUDATE (1) The red cells. The diapedesss of R.B.C. is a marked feature is some exudative inflammations. Unless the vessels are torn they do not come out before the W.B.C. They escape from the vessel passively because of the blood pressure and permeable walls. In some organs and with some bacteria they may be very numerous, thus the colon bacillus and the pyocyanic bacillus may preceed hemorrhagic exudate. The name Sanguineous or Sero-sanguineous is given to these exudates according to the proportion of blood and serum. They are best seen where a very vascular tissue is inflamed, as in a tubercular pleurisy or pericarditis. With the hemorrhagic constitution a slight inflammation may produce such exudate. In many general diseases with high fever multiple punctate hemorrhages are found in all organs and on all surfaces. Bu this is due partly to alteration in the blood, consequent imperfect nutrition of the vessel walls with special products of bacteria, like hemorrhagin. Blood plates are also carried out like the r.b.c., their presence is usually temporary, they are most numerous in exudates rich in r.b.c. and fibrin. [illegible] very. The plates are formed by extrusion from the r.b.c. Some of the w.b.c. pass out actively because of something causing positive cytotaxis is greater outside of the vessel than inside. This is the diffusible bacterial toxin which may either act on the vessel wall or pass thro & effect the leucocytes inside and these two actions may not be of constant or equal value. The emmi gration is favored by the dilation of the vessel, slowing of the current, and changes in the endotholium. The w.b.c. in inflammations are classed according to their staining affinities into:- Acidophile= taking acid stains; Basophiles= taking basic stains as hemotoxylon; Neutrophiles= taking mixtures of acid and basic stains. These affinities depend upon the presence of granules of different kinds in the cytoplasm of the w.b.c. The following w.b.c. are recognized:- (1) Lymphocytes small and large. The small considered as not the immature forms of all w.b.c. It is distinguishable from the cells of the lymph tissue except that it is found in the blood. The larger lymphocyte has a wider rim of cytoplasm and is supposed to be a slightly older stage. These are not phagocytes, the smaller are slightly amoeboid and make from 22 to 35% of the w.b.c.(2) The large Hyaline monoleucocytes, with a round or indented nucleus, which may be kidney shaped, slight staining power, abundant cytoplasm, no granules in the cytoplasm, actively amoeboid and phagocytic. It is rare in circulating blood but numerous in the fluids if tissue spaces and serous cavities and makes from 2 to 4 % of the total w.b.c. (3) The eosinophiles or coarsely granular oxyphiles, have a large horseshoe nucleus, the lobes often separate, large spherical graunles in the cytoplasm, highly refractive, taking acid stains strongly especially eosin. These are abundant in the fluid of serous cavities, the areolar tissue, the bone marrow and about chronic inflammtions. It is amoeboid but not phagocytic. They make from 2 to 4% of the total w.b.c. (4) Polynuclear or finely granular eosinophiles has a reticular cytoplasm with feeble adidophile and neutrophile granules, the nuclei stain deeply. It is actively amoeboid and phagocytic, absent from the tissue fluids but abundant in the blood. Making from 70 to 72% of the w.b.c. This is the most numerous pus cell. (5) Mast cell or coarsely granular basophi le They vary in size and contain large and small granules which are strongly basic, rare in the blood in health, not phagocytic; 1/2% of the w.b.c (5)

Lecture -V- 1-18-07. Continued.

(6) A finelt granular basophile, so-called transitional, with a three lobed nucleus, clear cytoplasm, with fine basic dots. Rare in the blood, 1 to 5%. There are more present after meals. Two os these six ore found almost exclusivelt in the blood, #4 and #6. Two almost exclusively in the body fluid, #3 and #5 and two are common to both, #1 and #2.

1-23-07.

SYNOPSIS OF INFLAMMATIONS.

1. Definition.
2. Etiology.
   a, Mechanical causes.
   b. Thermal " .
   c. Electric " .
   d. Chemic " .
   e. Bacterial " .
   Part played by bacteria.
   - I. Entrance: Wounds. Natural channels. Unbroken skin. Insect bites. Cryptogenic.
   - II. Infection modified by eight factors: Virulence of organism. Number introduced. More than one kind = Mixed. Heridity and predisposition. Pre-existing disease. Habit and environment. Fetal transmission.
   - III. Action of bacteria partly mechanical. Chiefly chemical: a. ptomain. b. leucomain. c. toxin. d. toxalbumen.
3. Stages of inflammation.
   (1) Alteration in structure of tissue cells, initial injury.
   (2) " " local vessels.
   (3) " " relation between vessels and circulating blood.
   (4) Secondary degeneration of cells.
   (5) Reparative proliferation.
   (All these stages are not always present.)
4. The reaction to injury.
   (a) Simplest case in one celled animals. In higher animals there are specialized cells derived from the mesoderm, which remove the irritant.-- cytoxis, positive or negative.
   (b) Slight vascular reaction, healing by first intention. The object of aseptic methods.
   (c) Marked vascular reaction; healing by second intention.
   (d) Severe vascular reaction-- Suppuration.
   (e) Healing by granulation, depends on endothelium and fibroblasts.
   (f) Inflammation with localized necrosis. Abcess formation; zones of an abcess, ends by rupture, burroving, encapsulation, calcification, pyogenic membrane.
   Pus- gross character, vary with the germs.
   Histology.
   Chemical composition, reaction, Sp.Gr., varieties.
   (g) Inflammation with diffuse necrosis, false membrane, croupous, and diptheric forms- fibrin.
   (h) Inflammation with gangrene.

5. Constitutional effects of inflammation.
   a. Aseptic wound fever.
   b. Septicemia.
   c. Bacteremia.
   e. Pyemia.

6. Chief factors in inflammation.
   a. Vascular changes- chiefly by experimental study.
   b. The fluid exudate- relation to bacterial virulence.
      good effects.
      bad " .
      Difference between { Normal lymph and serous exudate.
      Chemical composition.
   c. Cellular exudate.
      1. Red cells and blood plates.
      2. White cells and varieties according to staining { acidophiles. basophiles neutrophiles.
      and according to form etc.(six)
      3. Fixed cells- six varieties.-significance of inflammatory leucocytes.
         (a) Metschrinkoff's theory- phagocytes.
         (b) Pfeiffer-Buchner " - humoral.
         (c) Ehrlich's " - side chain.

7. Repair and regeneration- the former more important in man, the work chiefly or fixed con.Tis. cells-fibroblasts & endothelia.
   Inflammatory fibrosis in organs.
   " " within infectious granulomata.
   Productive inflammation.
   Factors in cells growth. { Non-inflammatory or replacement,
   Fibrosis classified as-- { Inflammatory.
                            { Neoplastic.

8. Influence of nervous system.
   Vaso-motor.
   Cerebro-spinal.
   Reflex.

9. Systemic effects { Shock. Fever. Effect on blood.

10 Classification of inflammations:-

A. { a. Diffuse parenchymatous.
   { b. Serous.
   { c. Hemorrhagic.
   { d. Fibrinous.
   { e. Purilent.
   { f. Diptheme.

A= Exudative.

B { a. Simple cellular.
  { b. Productive exudative.
  { c. Chromic productive.

B = Productive.

C. Characters of exudative inflammation in different tissues.
D. Characters of productive inflammation.

11.- Specific inflammations of infectious Granulomata.
a. tuberculosis.
b. syphilis.
c. lepra.
d. actinomyces.
e. glanders.
f. rhinoscleroma.
g. blastomycotic. and protozoan infections.

VII. 1-25-07.

Besides the cells given above we have other kinds. Giant Cells, which are formed by the rapid multiplication of nuclei, while the cytoplasm does not divide; formed also by the fusion of endothelia. There are also Ranvier's Cells, which enormous in size and break down easily; and there are Gluge's corpuscles, which are hyaline leucocytes. They have taken up so much fatty detritus that they have a mulberry appearance, and are called compound granular bodies.
Of the fixed cells we have:-
1. Epitheliod also called plasmocytes when they occur in the sheaths of vessels. These have a large vesicular nucleus, finely granular cytoplasm and take acid stains; they are derivatives of leucocytes and may return to these when inflammed.
2. Fibroblasts, spindle shaped, flat, with long branching processes at the ends, often much twisted to fit narrow spaces. The nucleus in the young one is oval and vesicular, in the old cell it may be a dense narrow rod. Cytoplasm somewhat granular, staining basic, usually.
3. Plasma Cells These vary in outline, have one nucleus which is round and eccentric, staining usually irregular,, the protoplasm along the edge being denser. Stains best with polychrome methylene blue. It is most common about blood vessels especially in chronic skin diseases. There are two forms of plasma cells, small and large, derived from the lymphocytes and destined to become fixed connective tissue cells.
4. Pseudoplasm cell, larger than the plasma cell, nucleus may be eccentric, cytoplasm homogenous, they stain with polychrome blue. They are commonest in skin lesions, are another form of plasma cell. Their peculiar staining is due to chemical and functional differences.
5. Chromatophor, or pigment cell, which is common in certain regions, as the eye and skin. In the skin they carry pugment from the deeper layers to the surface. The pigment is brown or black, free from iron, made by the cell's own cytoplasm.
6. Fat cell, which when adult has the signet ring form, the nucleus pushed to one side, and a large drop of fat replacing the cytoplasm. It is not known what cell is the starting point, either the fibroblast or the plasma cell.

THE SIGNIFICANCE OF INFLAMMATORY LEUCOCYTOSIS.

The local and general increase of polymuclear and other leucocytes in inflammation, the activity of tissues that produce the m, and their varying kinds and numbers in different inflammations require explanation. It was noticed as early as 1862 that some pus cells would pick up particles of finely divided matter, like Indigo. Not long after they were observed to put out pseudopods, and so pass thro the vessels walls. We now know that in many diseases that many bacteria may be found inside of cells. This has been made the basis, by Metschinkoff, of a theory of immunity phagocytosis. Hence all cells capable of taking up bacteria, other cells, or dust like particles are called phagocytes. Now he calls the polymuclears the microphage and the large hyaline he calls the macrophage. These are the most important of the leucocytes; the polyphage attack the bacteria, while the macrophage attack the other cells. Some degree of phagocytosis is found in the cells of the splenic pulp, fibroblasts, plasma cells, and endothelia of both blood and lymph channels. Thus

in some chronic inflammations small lymphocytes are found within the bodys of old fibroblasts and are thought to aid in the ir nutririon. In gonorrheal lesions the coccus is said not to invade the large hyaline cells but only the polys and epithelia. In leprosy the large hyaline carry the bacteria especially, and in tuberculosis the giant cells. In the work of ensphering bacteria either a single phagocyte may longthen out along a bacillus, till it is wholly or partly inside or several phagocytes group and fuse to a plasmodium within which the bacillus breaks down. At times many of the smaller bacteria will enter a single cell, even invading the nucleus.. The exact relation between the cell and the germ is not clear. It is spoken of as a battle and either may overcome the other. It is considered as a digestive process, the cell making a ferment called Cytase. This ferment is called microcytase when produced by the poly-or microphage and macrocytase when produced by the large hyaline or macrophage.

When anthrax bacilli are injected into the ear vein of a rabbit they are destroyed in the liver in 7 minutes; in the lung in 9 minutes, in the spleen in an hour. The bacilli that escape from one cell are attacked by another. If they are too numerous and too powerful the phagocytosis is insufficient and they multiply and destroy the animal. By injecting Metschinkoff's spirilla into the anterior chamber of the eye within a few hours we cause an excess of many phagocytes, and within them are small spirilla. Remove some of these to a hanging drop of broth, and the cells soon die and set free the spirilla. Transfere these to a nutrient medium and they flourish. This shows that altho ingested by the pus cells, they were not injured. The same thing is seen in gonorrhoea for the pus and epithelia cells take many of the cocci and the latter survive the death of the cells. In many subacute and chronic diseases like lepra, glanders, and tuberculosis, the power of the cells and the germs seem nearly balanced. This is though to explain the chronic nature of such diseases. Furthere it is proved that the more virulent that the bacteria are, the less they are ingested by phagocytes and the later does phagocytosis appear in the disease. By injecting into one ear of a rabbit a ~~nutrient~~ culture virulent, of anthrax, and into the other ear a weaker one, we get in the first quantities of reddish serum and a few leucocytes and in the ohter but little serum and many leucocytes, hence there is a clear relation between the number of bacteria invading , their toxicity, and the kinds of lesions that they produce. Metschinkoff claims that elucos that have the power to ingest and digest bacteria transmit this power for several generations of white cells. The time of immunity for a patient will depend upon his own bodily peculiarities, the form and character of bacteria of any disease and the extent of the primary lesion. The cure of zymotic diseases and the immuntity of certain persons depend upon the activity of certain cells called phagocytes, and the attraction between them and the products of bacteria. Further the process of inflammation is essentially a process to aid in the migration of W.B.C. outside of the vessels, so that they may ingest the cause of the irritation. It has lately been established that the serum prepares bacteria and cells to be taken up by phagocytes, and that the degree of this process is an indication of the patient's resisting power for any special disease. The element in the serum which so prepares the bacteria is called opsonin, and the rate of phagocytosis in a sick man as compared with that of a healthy person for the same germ is called the opsonic index. By injecting an attenuated culture this opsonic index may be raised e.g. increase the persons power of phagocytosis, as-

0.2 c.c. broth culture of staphylococcus.
0.5 c.c. 0.75% NaCl solution.
1.0 c.c. washed white blood cells.

Now put this in an incubator and no chage occurs, but if we now put in some serum, this will cause the bacteria to become active because the opsonin of the serum prepares them for phagocytosis.

Lecture continued.
Of 50 leucos an av. of 12 contained bacteria)
" " " " " " 7 " ") hence 7/12 or 0.5 is
the opsonic index.
There are some objections to the theory of phagocytosis:- In many infections there is no phagocytosis; in others phagocytosis follows bacterial ibvasion of the patient, instead of preceeding or coming with it; still in some others bacterial activity is marked even where there are many leucocytes, as in lymph tissue: further the bacteria may survive the cells which ingest them, as in gonorrhea; also the bacteria may actively invade the cell instead of being passvely taken up. Moreover in resistent animals, bacteria placed in the body in such a way that the phagocytes cannot reach, them, will not flourish as they should but are destroyed by the body's fluid.
Another theory is the socalled HUMORAL THEORY. This asserts that the body fluids are able to destroy the bacteria. This was shown to be due to distinct substanses in the plasma, one of them circulating in the plasma, resists a temperature up to 100 degress C., and is called the specific immuned body; the other is destroyed at 55 or 56 degrees C. for 30 min., is supposed to be a ferment like the trypsin, and is derived from the breaking down of phagocytes. For these elements in the blood the name ALEXIN was introduced by Buchner, and he gave to the phagocytes the lower rank of scavengers removing bacteria which were rendered harmless by the alexins. This would explain immunity as due to extracellular action of the leucos, for the alexins were supposed to be derived from them.

Lecture VIII. 1-30-07.

EHRLICH'S SIDE-CHAIN THEORY.
This presupposes that every cell has an active central chemical compound with which its idenity is bound up and that like that of the central benzol ring, this central chemical group persists in spite of changes in the side chains and the whole of this mechanism is for the nutrition of the cells. Now different body cells have a special affinity for certain drugs; e.g., heart muscle for digitalis; salivary glands for pylocarpine; the nervous tissues for strychnea. So do these side chains have special affinities for nutritive substances, which they fasten to the cell for its nutrition. Ehrlich gives the name receptor or haptin to these unstaisfied bonds. Hence the cell's nutrition depends upon the special affinities for the special elements brought to it by the blood. In chemistry certain substances are called isomeric, as $C_{10}H_{16}$ is either turpentine or oil of lemmon. Certain toxic substances may have the same affinities for these side chains, as nutritive substances. If so a poison, a toxin, a venom may combine with a cell and injure it and lacking such affinities it cannot combine and does no harm.
These receptors are of three orders;-
(1) Simplest They unite molecules of nutritive value or some toxins or cellular products. If cast loose from the cell and circulating in the blood they unite with and neutralize toxins and ferments & are there called antitoxins or antiseptics.
(2) These fix molecules of greater complexity by one of their bonds and by the other act upon it by kind of digestion, and prepare it for the use of the cell.
(3) These by one bond cling to the cell, by another they fix the molecule, and by a third they disintegrate the molecule. If they are separate from the cell and float in the blood they are called amboceptors or immuned bodies.
The side-chain theory supposes that in the blood of an infected animal there are two distinct elements. Without either of these the poisons cannot unite with the cell. One of these can unite with the cell and hence is called a Haptophore. Now such a union between the cells' receptors and the haptophores group of toxic elements is thus seen to be a modification of the mechanism of nutrition. The compound so formed is not nutritive hence the cell must either die or make other receptors. It thus produces receptors in abundance, these are cast off and circulate in the blood. There they meet toxin, combine with it and make it harmless. So the same thing while attached to the cell permits its injury, if separated from it may protect it. In this way the use of antitoxin is explained, for by injecting it we put free receptors for toxin into the blood at a

time when the body cells are not yet able to furnish them.
It has been proved by experiment that where an animal "A" , like a rabbit, is injected with the blood or serum of another "B", as a dog, every few days for five or six ~~xxxx~~ doses, the serum of "A" will ppt. the serum of "B" in a test tube the both are in a very weak dilution. The thing that does this is precipitin.
"A" injected with "B"s serum makes precipitin for "B".
Now if the red blood cells are used to inject "A" then "A"s blood will dissolve the blood cells of "B"; this process is called Hemolysis and the substance produced is Hemolysin. In a similar way a seriese of experimental bodies con be obtained each acting on but one thing. Thus the general name of anti-bodies is given and the substances that produce them is called anti-gens. Some of these neutralize enzymes and are called anti-enzymes, others dissolve bacteria= Bacterio-lysins; others cause the red blood cells or bacteria to gather in masses = Agglutinins.
The general name for a destruction action is lysis; and the thing which does it lysin.
Suppose we inject into ~~xxxxxxxx~~ "A" muscle cells of "B", then we get a myolysin; and if it is nerve cells we get neurolysin, in the specific serum. Now these lysins, because they poison cells are called Cytotoxins. The destructive cytotoxins or lysins are two fold, so that three elements enter into the process;-
(1) The cell to be destroyed;
(2) An element which resists a temperature up to 100 degrees C, & is called the immune body or amboceptor.
(3) which is destroyed by 55 or 56 degress C. for 30 min. and is called the complement.
The immune body connects the destructive complement, which has no affinity for cells, with the cells or bacillus to be destroyed, hence its name, amboceptor, because it unites both. The complement is a ferment and hence acts on the cells. Substances which prevent this union are called anti-amboceptors. The destructive specific characters of these reactions resides in the amboceptor or immune-body, e.g. if cholera bacilli are introduced into an animal, the immune body will develope in its serum and will unite with other cholera bacilli, and nothing else. In other words each haptophore group fits a special chemical affinity as a special key does into its own lock and no other. 1.
No Matter which theory we adopt e.g. the White blood cells are the chief protection of the body, or(2), that the fluids are the more important, perhaps obtaining their defensive characters from the leucos, it is almost a generalrule that a bacterial inflammation which persues a favorable course is attended by a marked increase ~~x~~ of leucos,which limit the inflammation. Further that in the worst cases of infection there may be no local or general leucocytosis, and so the bacteria are free to enter the general blood stream.
There are two of these cells which should receive special mention:-
(1)- The eosinophile cells. They are amoeboid and respond to cytotaxis but the stimuli which call them out of the vessels are different from those that affect the polynuclears. Eosin leucocytes are more common in the bloob, and locally with chronic inflammation and in some special conditions like intestinal parasites. In chronic bronchitis the sputa may contain large numbers of them. They come from bone marrow where they are formed, and in many diseases their appearance in the blood is one of the first signs that the patient is going to recover .
2. Lymphocytes. In some inflammations are the only w.b.c. locally increased. This is especially true of infectiou s granulomata, diseases like tuberculosis and syphilis. They gather in such numbers as to make kind of a granulation tissue about the tubercular and syphilitic lesion, and the process is called granuloma. They are feeble amoeboid, not phggocytic, and have such peculiar chemical affinities that they respond to the toxins of the se diseases, More over these diseases are particularly liable to involve and spread

by lymph structures where these cells are most numerous.

IX. 3-1-07.

Before the
~~There are four~~ processes of repair which begin after inflammation. Absorption of the exudate is ~~usually~~ necessary. This is rapid with serous exudate; with much fibrin present and some coagulation necrosis there may be fairly rapid solution and absorption, part being carried away thro the lymphatics, part is removed by the cells, and some in other ways. This occurs in lobar pnuemonia, for example, in which coagulation of the inflammatory exudate is an important feature. In cases which recover the greater portion is removed b y the lymphatics of the lung while some is coughed out. On serous surfaces the fibrin is usually thick, and tough, and is commonly organized by the growth of fibroblasts and vessels into it from the subendot helial tissues. This may make firm adhesions which gradually stretch and dwindle and are called false ligaments. The power of regenerating parts, shown in lower organisms, is entirely lacking for the huma n beings, hence we have fewer cases of regeneration after injury but most of them are ~~examples~~ repair. The tissues in man of least specialization withstand injury and poor nutrition best, thus in a gangrenous part of the connective tissue, including ligaments, tendons, and main vessels, often resist for a long time. Tissues of high specialization are repaired by the formation of a lower type, e.g. fibrous tissue. In an early stage of an inflammation the fixed cells may multiply and this is an effort at repair, but with strong toxins present these new cells may not be able to make tissue and are lost.
When the power of the toxins decreases repair begins , and thus one use of the fluid exudate is to weaken and remove the toxins, so that repair may begin early. Repair depends chiefly on endothelial and fixed connective tissue cells, but some cells have a reparative or regenerative power, thus on a mucous surface a shallow ulcer may be completely repaired by the epithelia multiplying and growing in from the sides. In serous membranes subacute inflammat ions may involve only congestion and the multiplying of the invest ing endothelia, this is sometimes called cellular enfluenza. The new cells so formed have but little intercellular substance and not many vessels, but the final result is a kind of fibrous tissue. Inflammatory increase of fibrous tissue is seen typically in the large organs like the liver and kidney. The new cells come from the old fibro-blasts of the stroma or from the sheaths of vessels and and partly from the leucocytes which wander in.
All stages may be seen from early clusters of emb ryonic connective tissue cells to new fibrous tissue rich in cells and old scar tissue made up almost entirely of fibers. Such scar tissue always begins to contract; this causes poor nutrition and atrophy of the functionating cells and hence is very important for the health of the patient. The name usually given to these chronic inflammations is ~~cirrhosis~~ cirrhosis. With the death of the gland cells there is an effort on the part of some to make up for the lost cells by enlarging a nd multiplying. This regeneration frequently passes the normal limits and produces new growths or tumors. In tubercular and syphilitic inflammations the feature may be multiplication of endothelia and fibroblasts and but few migrating leucocytes. The result is a kind of granulation tissue in which giant cells are common. The leucocytes, the endothelia, the connective tissue cells and the simplest that we have, the oldest historically, and are all derived from the mesoderm, and hence because homogenous may replace easily one another in reppir.
The forms of inflammation which result in new tissue are called productive. We have some which are distinctively exudative; some exclusive ly productive; and others which combine the two p rocesses. The fibrous tissue which results from a productive inflammation is different from the normal fibrous tissue derived from the embryo. This new tissue tends to become steadily less nucleated, less vascular, more fib rous, denser, and smaller. This is like a rapid attainment of senili ty. All the new fibrous tissue cannot be regarded as inflammatory. It may occur in conditions other than those of in flammation, thus in

in the tracts of the spinal cord after injury and disease the atrophy of the medulated fibers is made up by proliferation of t he neuroglia. This is a replacement fibrosis.

Cellular growth is due to four main factors:-

1. Increased nutrition.
2. Increased physiological action.
3. Stimulation and irritation.
4. Removal of pressure and other preventive influ ences.
5. Combinations of these.

We distinguish between fibrosis which is inflamma tory and that which is not. In most cases of the latter type the chief factor is disorder of the nutrition. This causes the death of specia lized elements; the fibrous tissue is relieved of its pressure and is the only thing which can flourish in poor conditions of nutrition, thus is the heart, as a part of old age, or if the lumen of the Coronary Arteries is slowly reduced, the muscle cells die and in that same proportion a replacement fibrosis occurs. The muscular cells nearest the vessels retain their nutrition longest and are the last to be replaced. This condition is called a fibrous myocarditis, as if it were an inflammation but strictly it is not.

Marked grades of inflammatory Hyperplasia are found in the lymph nodes near infected wounds, they enlarge, partly because of hyperemia and serous exudate, but chiefly because of the proliferation of their lymphoid cells, and of the endothelia in the main sini from the effect of the absorbed irritant. In the subacute and chr onic inflammations of the mucosa, in the nose, stomach, uterus, etc., the cells and fibers of the stroma multiply making a hypertropic stage and the glands become large and tortorous. With a chronic stasis of the lymph we get a form of inflammation known as Elephantasis, which may greatly increase the size of the part affected. In these chronic productive inflammations we very frequently find transitions to true tumor formations, the reaction to the irritant passing the normal limit and becoming atypical. We group these hyperplasias as follows

A. Inflammatory.
   1. Local.
      a. Scars.
      B. Thickening of capsule or serous membrane.
      c. Some cases of replacement.
   2. General
      a. Infarcts and dystrophies.
      b. Cirrhosis of large organs often multiple.

B. Non-inflammatory.
   1. Type due to increased arterial supply.
   2. Type of chronic venous congestion.
   3. " " " lymph stasis.

C. Neoplastic- fibroma and its combinations.

Influence of the nervous system in inflammation.

Certain well known facts proove that this may be strong, thus with tooth ache one entire side of the face may redden and swell; In pneumonia we frequently have small blisters on the lips = Herpes labialis; a more complicated case is the kidney lesion which may follow the simple passage of a catheter thro the urethera to the bladder, there follows a supression of the urine, either from the contraction of the arterial branches in the kidney, or from the extreme dilitation of the vessels and congestion, both of them being reflex vaso-motor results. With either a true nephritis may begin, caused in the first case by anemia and death of enough cells for the dead matter to act as an irritant; or in the second to the paralysis of the vessels.

A stronger proof of the effect of the nervous system is shown in hypnotised patients, where the suggestion of a red hot iron will cause hyperemia and a serous exudate said to be hurried . Further where a part is subjected to pressure or its nerve supply is impaired we may get obstinate destructive ulceration, as seen in the formation of bed sores and similar lesions of parts that are paralyzed. when the Occula branch of Fifth nerve is divided in an animal, the cornea

ulcerates and suffers necrosis in a few days. If we close the lids or cover the eyes with a bandage this does not happen. The explanation is that foreign particles lodge upon the eye and irritate it if unprotected, and further the resistant power of the part is decreased because of the impaired vitality. The same thing is seen in human leprosy and many nervous diseases where loss of feeling in the skin leads to injuries and these are followed by severe ulceration. It is a matter of importonce to determine what kind of nerves are most important in these cases, the cerebro-spinal or the vaso-motors and sympathetics. The vessels throughout the body are accompained by a fine mesh work of sympathetic filaments with a ganglion cell here and there. Authorities do not agree whether these are chiefly motor or sensory.

Lecture X. 2-6-07.

The part played by the two systems of nerves can be studied in the ear of the rabbit. The ear is supplied by the major and minor Auricular branches from the Cervical plexus, and by sympathetic filaments from the superior cervical ganglion. If the former are stimulated the ear vessels dilate; if the latter are stimulated they contract. If we divide the Auricular nerves on the right side and the sympathetic on the left and inject an equal amount of streptococcus of erysipelas into each ear, on the side where the cerebro-spinal nerves are not acting and only sympathetic control persists the inflammation is worse, takes longer to heal, and leaves more mutilation. In the ear with no sympathetic control we have more hyperemia, more active inflammation, quick recovery, and no mutilation. Such experiments show how the central neuron influences inflammation and how important for healing the dilation of the vessles is. But since inflammation may occur where there is no nervous control the action of the nerves is not essential. In general then is vaso-motor dilators alone act the process is hastened; if vaso constrictors alone, it is delayed and results are worse. With inflammation in one part a distant inflammation may be set up by a reflex passing thro some nerve or even from some center in the cord or brain. Lastly the influence of the nerves is more distinct in exudative than in productive types of inflammation.

THE SYSTEMIC EFFECTS. These include the following :-

If the reflex action is very severe the wave may be arrested in the central nervous organs and cause shock. These may accompany inflammation from the absorption of toxins which irritate the heat centers, or from absorption of the products of the cell destruction, especially albumonise.

The circulating blood is somewhat condensed from loss of plasma in the exudate and hence the Sp.Gr. is high General spasm of the arteries may raise the pressure and both these effects are more marked if the inflammed surface is large.

The leucocytes in the blood first decrease in number and then increase-- the deacrease is due partly to their escape from the vessels and collecting around the focus and partly due to their destruction in the blood stream; the increase may develope in a few hours and last many weeks. In the adult the polys increase most, and the eosins may be less numerous till recovery begins, when they increase. In the child the lymphocytes are the most numerous usually.

THE CLASSIFICATION OF INFLAMMATIONS.

In naming an inflammation it is the usual custom to add the syllables "itis" to the name of the part affected,e.g., inflammation of the stomach= gastritis; of the lung = pulmonitis; of the bronchi = bronchitis,etc. We also add the word acute or chronic or some other to denote the severity of the lesion, or some word like purulent or fibrous to denote its variety. Many inflammations were named before the nature of the lesion was understood, hence pneumonia= inflammation of the lung; inflammation of the floor of the mouth = angina, from the choaking sensation which accompanies it. Inflammation deepin the skin is called phlegmon. others from the

discharge are called catarrhal; others due to a s pecial germ are called specific. Those that effect the large orga ns are called parenchymatous, if involving functionatin g cells, but interstitial if involving the stroma (sclerosis and cirrhosis are synomymuus also with the latter. With inflammation insid e a hol low organ the prefix endo is employed; if on the outside, peri, i f near by para. There are two main types of inflammations:-

A. Exudative.
   1. Diffue parenchymatous.
   2. Serous.
   3. Fibrinous.
   4. Hemorrhagic.
   5. Purulent.
   6. Croupous and diptheric.

B. Productive.
   1. Cellular or simple.
   2. Productive exudative.
   3. Chronic productive or interstitial.

1. Diffuse parenchymatous. Degeneration is the chief feature vascular changes so trifling or temporary that they leave no track behind. Irritants of very mild degree or slight i njury to the skin or mucous surface may destroy a few cells and deg eneration begins almost at once. In mild infectious diseas es many of the large organs like the kidney, liver, and the heart, show lesions of this kind necause of the circulation of the to xins in the blood. This in particularly common and distinct in the kidney , where it is usually called cloudy-swelling. The orga n as a whole is swollen because each individual pithelial cell has taken up extra serum. The parenchyma is the most involved, hence the name parenchymatous inflammation. The different infec tious d iseases show a tendency to involve certain tissues and o rgans; e.g. in typhoid the muscles suffer; in diptheria the peri pheral nerve fibers; in yellow fever the liver cells; in scarlet fever th e kidneys. The degree of the effect will depend upon two things the strength of the irritant and the lenght of time that it acts,

The various stages are swelling, from the ab sortpion of serum; ppt. of proteids in the cytoplasm; bursting of the cells or fragmentation of the nuclei and later fatty changes. In a worse degree acute hyperemia and intercellular oedema may be f ound. The function may show but little change and any cells which di e may be replaced and recovery is complete in the mild grades.

2 Exudative inflammation of the serous type include s the one just described, but we commonly think of a more seriou s condition and we grade the severity by the nature of the exudate. The appearance in the exudate of elements that pass outof the vesse ls with difficulty are characteristic of worse degrees, hence the first element to pass out, or serum, is found with the mil d exudative types; while hemorrhagic, purulent, and fibrinous are far more severe.

The nature of the exudate varies with the int ensity of the irritant, the structure of the tissue and the constitution of the subject, e.g. equal amounts of pneumococcus are inje cted into the following animals with the following varied resul ts:-

Animal.	Local effect.		Constitution.
House	none.	dies of	septicemia in24hrs.
Rabbit.	odema,hemorrhage-	" "	" "48 :.
Rat	Sero-fibrinous	" "	" 3 to4 days.
Sheep	" " and round cells.	Lives.	
Dog	Round cells	" .	

If we put the germ into the lung direct the first three will die of septicemia and the other two if they die at all, will be by pneumonia.

In connective tissue the intercellular subs tance may be infiltrated by the serum, hence swollen; the vessel s are congested, the cells are somewhat altered but recove r when the lymphatics remove the fluid. Some of the oedema is carried o ff by the blood vessels, most of it by the lymphatics. The fibrin is slowly liquified and absorbed; many pus cells break down and are carried off by the phagocytes but with many polys and mu ch dest ruction of cells a

deposite of mucin may remain in the tissues for a long time. The anitomical position of the organ is often important, thus a mild degree of serous exudate in the larynx may cause death by closure of the glottis; or in the ventricles of the brain by pressure on im important centers. By contrast the serous cavities are very tolerant of exudative inflammations. On mucous surfaces the name catarrhal is often given to the exudative inflammation of a mild type. The basement membrane limits the process to the investing cells for a long time. The stroma consists of reticular tissue, with many lymphoid cells and a rich vascular supply, with many lymphatics. Here the changes for connective tissue may occur. The glandular layer shows increased activity, mucous is made at a faster rate and in a pathological way, many entire cells are converted into mucin. Commonly this is preceded by severe hyperemia and decreased excretion and is called the dry stage. As secretion begins the hyperemia is partly relieved, If the lesion last any time the quality of mucous is changed; it becomes thinner and perhaps irritating. The duration of this first dry stage differs on different mucous surfaces and seems to bear some relation to the amount of lymphoid tissue present. As the secretion increases and becomes altered many of the epithelial cells are loosened and are cast off, singly or in masses. At times the cell may be converted into a globule of pure mucin, then they are called mucin bodies. At a later stage the pus cells are numerous, the discharge is thicker, and sticky and may be yellow or green in chronic cases. Many of the more severe inflammations on mucous surfaces are accompanied by a large per centage of fibrin in the exudate. This clings to the superficial cells as a false membrane and under it there is necrosis but not to the degree observed in true diptheria.

Please make the following corrections in your notes, and dont kick.

Page 1.
Line 23, Ptomatic should be "traumatic."
" 29 Tumor " " "tubercle."
" 32 Faecal should be "clinical."
" 35 purportrating" should be "perpor trting".
Seneond to last line "anthrax" should be "stephlycoc cus."
Line 30 Noncurable should be "non-purulent".

Page 2.
Line 30 "Preparative" should be "reparative."
" 38 Infection should be "infiltration."

Page 4.
Line 18(from bottom) "mechanical" should be "mediu m."
" 14 seen should be "broken".

Page 6.
Line 33 "Feeble" should be "fecal".
Last paragraph 0.37 and 0.70 should be ~~0.37~~ 0.37 and 970 (Neutral Part.)

Page 14. Line 35- "nutrient" should be "virulent."

Page 16, line one should read " time when the body cells are not yet able to furnish them."

Page 18. first line insert * "injury" so as to read "after injury and disease, ect."

Yours truly M.H.B.

Lecture XI. 2-2-07.

(Inflammation on a mucous surface continued.)
In depressed conditions of the system with certain special bacteria and anemia small or large hemorrhages may occur with inflammation of the mucous. The blood may be found among the investing cells and in the gland lumena or next to the basement membrane or deeper in the submucosa. Many red cells are mixed with the discharge on the surface; thus in yellow fever multiple small hemorrhages from the gastric mucosa give rise to the "coffee ground" vomit. The epithelium may be lost in a very shallow way, removing only the uppermost layers, and these are called erosions, or they may go thro the whole mucosa to the muscular coat. Such erosions are always found over hemorrhages in the membrane and in the stomach and duodenum they help to form round ulcers.

Microscopically the discharge shows beaker or goblet cells, many of them broken, some distended, as mucous corpuscles; red cells; w.b.c. which have migrated between the epithelium or been discharged in quantities from an eroded surface; shreds of mucin, filaments of fibrin, fatty cells, and crystals and bacteria.

In mild inflammations the mucosa may completely recover, with purulent or hemorrhagic from ulcers may persist for a long time. Thus in the large intestine indolent ulcers may discharge for years without serious injury to the patients health. With severe inflammations or repeated attacks the lesion is apt to become chronic, resulting in hypertrophies, some times in the production of small tumors, or in a progressive atrophy, which destroys the entire thickness of the membrane and its function.

Exudative inflammation on a serous membranes.
Here the subserous and submucous connective tissues suffer like the other connective tissues.
The exudate is remarkable for its quantity, because of the positive pressure in the hyperemic vessels, and the negative pressure in the serous sack. Hence whether it is serum, fibrin, or pus, or all three with red cells added, the quantity is large. In the pleura a liter or more of fluid or a layer of fibrin a C.M. or more in thickness may be formed inside of 48 hours. Some of the severe distress of patients is due to the resulting intrapleural pressure and in long standing cases the air may be forced out of the lung, and the heart displaced from the pressure of the exudate. Whenever the space is limited as in the cranium, ventricles of the brain, and the joints this fibrinous exudation is often the most important feature of the lesion. On a membrane like the pleura the fibrin adheres where the endothelial cells have fallen off, or covers others which are attacked. Removing this fibrin, the surface below is found opaque, perhaps hyperemic, with punctate hemorrhage.
The fibrin occurs in granules, threads, bands, and masses and floats in the fluid as flocculi. In healing much of it is removed but frequently some is organized making false ligaments, which hinder the movements of the organ. Thus with adhesions between the layers of the pericardium we have synechia pericardii and the movements of the heart are very much hindered; in the peritoneum portions of the gut may be strangled by such false bands.

Exudative inflammation in lymph tissue. The stroma changes are as for the other connective tissues. The lymphocytes multiply rapidly; the delicate reticulum thus begins to thicken; the endothelial cells which line the lymph channels swell and scale off, and proliferate. This is sometimes called an endothelial catarrh. This is an important feature of typhoid, for the new endothelia are actively phagocytic. In some tissues like the spleen, the combined hyperemia, oedema and proliferation of the cells may increase the size of the organ, stretch the capsule, and lead to rupture of the organ with slight force or spontaneously. Among intestinal lymph structures coagulation necrosis may occur and the dead tissue is cast off and a slough leaving ulcers.
Exudative inflammation in the viscera. In the viscera oedema swells the organ by separating the elements from each other, and there may be an infiltration of leucos. The exudate is found between the epithelium of the parenchyma and also in the gland lumena, alveoli and

ducts. The organ's secretion in some cases can be collected and examined. This is the basis of our study of the urine in disease. If we find in it serum albumen we know there is a serous inflammation in the kidney; if we find serum globulin also we know that the lesion is more severe, and in worse cases, red cells, pus cells, cast off renal epithelial, coagulated fibrin, and casts are found.

With any exudative inflammation in the viscera there is some degree of degeneration and death of the functionating cells. Then function of the gland then may be altered or suspended. Frequently the glandsproduct is rendered abnormal for a time so that if anything depends upon it, in the digestion, the body is deprived of that while the lesion lasts. To these inflammations of the viscera we give the term parenchymatous, if the functionating cells are involved; interstitial if the stroma suffers most; and diffuse if both are attacked.

Abscess formation

Inflammation with necrosis is important from the fate of the necrotic tissue. If on a surface or ina canal where it may be voided, the resulting ulcer may be shallow and heal quickly; or deeper with scaring in proportion to the extent on the death of the tissue (necrosis). Deeper in the tissues the dead cells make a focal necrosis, which may spread and involve large parts of the organ, or become and abscess with the danger of bu rroving and rupture or be healed by fibrous tissue and lime salts.

Diptheric inflammation is seldom seen in connective tissue. One case is malignant erysipelas, which involves the subcutis. Here there is diffuse and spreading necrosis, with liquifactionl coagulation,and suppuration, to which the common name phlegmont and cellulitis are given. On mucous membrane such necrosis may be shallow or deep, localized or extensive. The resulting scars may cause stenosis of canals and similar deformities. They are not all due to the diptheria bacilli, but the toxins of diptheria usually cause sever necrosis. When the true toxin has been removed from the culture, there remains a second weaker toxin which will still cause necrosis. When the false membrane frorm it is cast off by suppuration beneath it. But in some malignant cases no false membrane forms On the surface of wounds in weak and neglected patients diptheric inflammation may form false membranes and cause necrosis.

ULCERS.

Tissue defects which result from inflammation with necrosis are of three degrees:- (1) simple erosion; (2) shallow ulcer, which takes in ar part or all of the mucosa; (3) deeper, which pass beyond the basement membrane.

The edge of an ulcer may be sharply cut or rough, overhaning or undermined or peelicate. The base or floor may be smooth, granulating, nodulent, covered with pyogenic membrane, or partly scarred. Where one side keeps breaking down and advancing it is called serpiginous; when still more destructive = phagedenic. In the processes of healing the granulation may be excessive, making "proude flesh" or caroluxurians. Healing may be delayed, the large granulations may be bluish, and bleed easily, and when partly healed break down again = Indolent ulcer. When the floor of the ulcer is a mass of tough scar tissue, it is called a callous ulcer. In the stomach and deuodenum there is a lesion called round ulcer, peptic ulcer, or ulcus rotundum. This is not strictly an ulcer for it is due to digestion of part of the wall after it dies, and hence is not inflammatory. In certain nervous diseases a perforating ulcer of the foot,occurs, and in the bed ridden, bed sores over bony prominences develop-also called ulcers of decubitus. These are more necrotic than inflammatory.

As ulcers heal the reparative hyperplasia along their edges may go beyond the normal limits and lead to a tumor, either benign or malignant. The same result may follow folding in of a portion of the epidermis in the scar, and from the cells so buried carsinoma may start later.

Lecture XI. Cont.

Productive Inflammation:
Of this we have three forms;- Simple cellular, Productive exudative, and Chronic productive. They take their name because new tissue is produced in each.

(1) Simple acute productive- good examples are s een on serous membranes, or pleura, peritoneum and meningese. The vasculary action is limited to moderate hyperemia. There is rapid multiplication of the endothelium and some of the endothelial fribroblasts. The endothelia swell, project from the surface, and may fuse to compound cells. From these in time a compound fibrous tissue may result. New endothelia cover this and the smooth serous surface is restored. This cellular in inflammation occurs in places where the cells are able to proliferate and mild irritation acts for a long time. In disease it may accompany other inflammations of strictly exudative type, as in the pleura over an area of pneumonia, or on the peritoneum of the intestine with ulcers on the mucous side.

Lecture XII. 2-13-07.

(2) Productive Exudative Inflammation. Here the production of new tissue is present from the first. But there is also a vascular reaction strong enough to produce and exudate. This may consist of serum, fibrin, or pus, as in any other inflammation. The new tissue is formed by the fibroblasts and at first is very well supplied with both cells and vessels; later it becomes less vascular and less cellular, that is, more like adult fibrous tissue. Lymphocytes and polynuclears may be numerous and in some cases, especially in the skin and mucous membranes eosinophile cells and plasma cells and some times the mast cell are numerous. The new capillaries come budding from the old vessels, and if they are too small or too few they are unable to nourish the tissue and then necrosis of various kinds will follow.

With the beginning of healing the exudate can be mostly removed, but the new tissue persists and usually keeps on growing; hence in time from a few scattered foci an entire organ may be gradually invaded by new fibrous tissue. This steadily grwos denser and contracts and there is no possible recovery for the organ.

Such productive exudative inflammations are often chronic from the start; they sometimes begin acutely, as in the nephritis which complicates scarlet fever, but the acute stage is liable to be short and is followed by production without exudation. All inflammations of this type tend to become chronic and may last for many years with occasional exacerbations, with periods of imperfect recovery in between.

The results depend to a great extend upon the site of the lesion. In connective tissue the stroma and the new elements are infiltrated with the exudate. The walls of the arteries and ducts are often much thickened; surfaces may be distorted and retracted and adhesions formed between various tissues. On a mucous membrane the stroma may be chiefly involved with but little change for a time in the secreting cells. The exudate makes its way to the surface, and there is usually a catarrhal discharge. The new tissue may constrict glands and mand make then cystic; may compress vessels, and lymphatics, and lead to atrophy. In the visera the growth of the new tissue may be diffuse or localized; in the former case it is worse for the function. The functionating cells may atrophyand degenerate, and be lost with the secretion of the gland, and special elements like the glommeruli of the kidney may be atrophied from combined pressure and anemia. From the loss of epithelia the total secreting surface of the gland may be much decreased.

(3) Chronic productive inflammation. The causes may be local, like obstruction of ducts or disease in the walls of the nutrient arteries, or the cause may be general with systemic intoxications, and repeated mild infections. Some are due to foreign bodies, as when dust settles in the fibrous tissues of the lung or pigment in the tissue of the spleen, causing irritation enough to produce fibrous hyperplasia. Some are caused by alcoholic and other poisons and errors

in the diet, shown especially in the liver.

The function of the part is always injured and in excerbations may be lost. In many cases the loss of function is very slow, and there seems to be but little effect on the general constition until the limit of tolerance is reached, e.g. in many cases of chronic interstitial nephritis the patient does not know he is sick till some suddne fatigue, exposure to cold, etc. brings on an acute at - tack of uremia. As a rule we cannot tell when the lesion begins to develope, it is almost always chronic and gradual. The increase of connective tissue may be accompained by disease in the vessel walls, decrease of their lumen and hence progressive anemia of the organ. New vessels may form, but usually not.

Among the newly formed fibers groups of round cells are found which are either lymphocytes or fibroblasts, and from here the fibrous development goes on. Most of the special cel ls of the part suffer a slow atrophy, but a few sometimes enlarge, as a kind of repair.

On surfaces both mucous and cutaneous there are often tumor like outgrowths called polypi(us). The secretion may be less or lost as in chronic atrophic rhinitis or sometimes increased as in chronic bronchitis.

The glands may be cystic from constriction of their ducts.

The tissues most affected include:- the stroma of organs; the reticulum of lymph nodes; the neuroglia of the brain and cord; walls of vessels; ducts; and other connective tissue.

INFLAMMATION IN BONES. Oseous tissue does not present the lesions of exudative inflammation, but both the marrow and the periosteum may do so. The nutrient vessel running in narrow canal with unyielding walls and a small amount of exudate may compress them and so caue the death of a larger or smaller section of bone. In the same way exudate beneath the periosteum, strips it up and deprives that part of the bone of nutrition. The dead bone is removed by an inflammatory reaction along a line of demarkation. This includes three steps

(1) Absorption of the mineral salts from a thin layer of bone surrounding the dead part of sequestrum.

(2) In this layer a granulation tissue developes, capable of exudative changes.

(3) Suppurative inflammation here loosens and partly absorbe the sequestrum.

The bone is partly broken down by large cells called osetoclast Complete extrusion of the dead bone is seldom possible without surgical aid. The whole process is called necrosis by the surgeon. When a suppurative inflammation attacks cancellous bones some of the trabeculae break down and the discharge contains fine granules of mineral nature. This is called cares.

With a chronic inflammation of bones the true bony tissue may be replaced by osteoiod or fibrous tissue, making rarefying osteitis or new bone of unusual hardness is formed and we have sclerosing osteitis, or eburnation. Very often the two processes are combined in the same bone. This is true of gout and rheumatism and other diseases of bones and joints, and since new bone may develope as exostoses the joints become distorted or dislocated or limited in motion.

With chronic inflammation of the periosteum the osteoblasts multiply and make new irregular bony deposites called exostosis or osteophytes. The inflammation may begin inside and pass out to the periosteum, or begin out side and go the other way.

XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX

SPECIFIC INFLAMMATIONS OR INFECTIOUS GRANULOMATA.

These are a group of diseases caused by specific microorganisms whoselsions present characteristic foci of abnormal granulation tissue which has a tendency toward necrosis. The type of inflammation is usually productive and these lesions resemble both the inflammations and the tumors. They are the following.

(1) Tuberculosis, (2) Syphilis (3) Glanders (4) Leprosy (5) Actinomycosis (6) Rhinoscleroma (7) Blastomycetic and protozoan invasions.

The word tubercle means any small nodule. It was first used before we knew anything about the tubercle b acillus. But it is now saved for the tubercle bacillus entirely. These tubercles were once distinguished by the their color as white, grey or yellow tubercles, but we now know that this is of no importance.

The bacillus was discovered by Robert Koch in 1882, and is one of the best examples of an obligate parasite. By passing it thro an amphiba its more hardy qualities can be restored and then grows freely at room temperature.

The organisms of diptheria, tuberculosis and actinomycoses are closely related to the fungus called streptothrix, for they all make branches or club forms and resist drying.

The tubercle bacillus is 3 to 4 micro-m.m. long by 0.3 to 0.4 micro-m.m. broad, stains with difficulty because of the presence within it of two kinds of fat but when stained resists both acids and alcohol. The smallest tubercular lesion is not visible in the gross, it is a granuloma and a group of these (Granuloma) make the smallest visible tubercles, called milliary. A group of millary tubercles, when large, makes a conglomerated or solitary tubercle. The tissue may be affected but show no tubercles and it is then said to infiltrated.

Lecture XIII. 2-15-07.

Tubercles vary from scattered points to large masses several centimeters in diameter and the gross appearance is partly determined by the nature of the part involved, hence tubercles in the skin, in lymphoid tissue, in the brain, bone marrow, and on serous membranes, have different gross characters, though histologically they are almost identical.

A tubercle is composed of certain cells which are not characteristic in themselves, but in their arrangement. In a typical tubercle there is a central giant cell, which often has a large amount of cytoplasm, from which processes radiate into the tissue as a net work. This giant cell has 20 to 100 or more nuclei, arranged in one of two ways, either heaped up in the middle, or placed in a circle or part of a circle along the edge. These nuclei are oval with their long axis on the radi of the cell as if they had moved to the edge end first in search of nutriment as the center dies. These giant cells are formed chiefly from the endothelia of lymph and blood channels by a process of multiplication and fusion. They are phagocytic, for they often contain the only bacilli which will stain; they break down easily and do not appear to destroy the bacillus. In a ring about the giant cells lying in the spaces of its reticulum there are large epitheliod cells with large oval nuclei and glistening nuclear bodies. The net work between them is most distinct in the older lesions. Out side of these comes a ring of lymphocytes, especially numerous in the acute forms.

The epitheliod come from the fixed connective tissue cells, and the lymphocytes from the blood.

Epitheliod proliferation both focal and diffuse occurs in many diseases, including pneumonia, scarlet fever and typhoid fever, etc. The giant cell is found in syphilis, in many tumors, about foreign bodies, and in granulation tissue, and the lymphocytes are common to all inflammations. Further while the tubercular lesion is productive and non-suppurating, there may be exudation in some cases, hence the only characteristic thing in the lesion in the grouping of the elements; the only positively sure thing is finding the bacillus.

When the lesion in chronic the central part always suffers caseous necrosis. Its cells refuse to stain, there are fine dust like particles of chromatin scattered thro it, from the destroyed nuclei, and in the gross it is firm, yellow, and structureless, or softer and creamy.

Phagocytes may be seen in the edges of the lesion, making their way into it as long blue nuclei, often bent and twisted, with clubbed ends. Karyorhexis is very common, so that fragments of nuclei may be found along the edge. Remanents of former tissue and ghosts are seen(unstained nuclei of blood cells) and in some cases

the giant cells are found only along the margins of the focus. Such a lesion is hopelessly dead and acts as a foreign body, hence a fibrous capsule may form about it, and calcium salts may be deposited in it and starting from this a general fibrous hyperp lasia may extend in all directions.

In bones and joints the formation may be spongy or fungus like; on mucous membranes and skin papillary and warty outgrowths are common, often along the edges of the indolent ulcers; on serous surfaces the lesion is often hemorrhagic or fibrinous.

Imperfect vascular supply is constant in tubercles, except in their early stages, which explains the tendency to necrosis(shown by injecting the part when the injection stops at the edges of the tubercle). The bacilli may be carried elsewhere f rom such a lesion as it softens and make capillary thrombi and set up new lesions. When the wall of a vein is attacked dissemination of the tubercle bacilli thro the system may be very rapid. This causes an acute disease General Milliary Tuberculosis, which resembles typhoid and is fatal in a short time. Commonly such dissemination is partial. This may result in the formation of single and large conglomerate tubercles in the brain, spleen and other organs. There may be no symptoms till the disease begins to spread thro the lymphatics.

The lymph stream is always involved and the nodes nearest the point of entering become enlarged, soft, and caseo us. Thus when bacilli enter the mouth they may lodge in the crypts of the tonsils, pass to the nodes in the neck, and set up lesions in them. These may soften and discharge on the surface, and thus prevent systemic infection.

When a lung is involved the disease spreads to the other lung and the larynx by thesputa, which often contain enormous numbers of bacille(billions)per day). Lazy patients, especially at night, have the habit of swallowing their sputa and so they infect their intestines. The phagocytes on the surface of the intestinal structures carry the non-motile bacilli deeper into the tissue and thence to the mesenteric nodes.

About 80% of adult patients have these secondary intestinal lesions as well as those in the lung.

In fection proceeds from host to host. It is not known whether there is an intermediate saphrophitic stage outside of the body. The bacilli are resistant when cast off, but do not reproduce till the proper conditions of heat and moisture are again found.

The commonest poit of entering is the respiratory system. The dried sputa containing the bacilli being inhaled with the street dust An important feature with lung lesions is the discharge of the bacilli to a distance with coughing and speaking. This may carry them from one to two meters from the patient. Hence the friends and relatives should be warned not to sit near the patient, or the patient should be told to cover the face with a cloth which can afterward be burned.

In the new born the disease may come from the father, when it is known as Spermogenous: if from the mother = Oogenous ; if from an infected placenta = Plakogenous. In babies infection is common thro the alimentary canal, from the milk of diseased cows ~~x~~ appearing as Tabes Mesenterica, or tuberculosis of the mesenteric nodes. In the presence of fat tubercle bacilli will pass thro the intestinal wall without causing any lesion in it. They may then stop in the nodes, or go to the liver or lung.

Rarely infection is thro a wound as circumscision.

The influence of heritidy is now thought to be less important than formerly. All that there is inherited is a constitution below the normal in resisting power, not the actual disease.

Tubercular lesions are among the most common, estimated as causing about 40% of all deaths in large cities. More than 50% of all bodies that come to autopsy show some tubercular l esion, and in one seriese of 500 where special search was made 97% showed some trace of tuberculosis. A scale of frequency with which the tissues are attacked runs about as follows:- Lung, nodes, intestinal mucosa, bones and joints, skin, central nervous ~~system~~ organs, and muscles. Since the disease is so wide spread, why is not every one tubercul-

ous

There must be conditions on the part of the bacillus and on the part of the patient. The conditions for the bacillus are:-

(1) Numbers. A few are probably inspired or swallowed and destroyed.

(2) Virulence. The experiments in the labratory do not agree with the facts of actual disease, for bacilli which are inspired with the street dust or swallowed, especially on raw fruit and vegetables, the bacilli are aften attenuated by heat, sunlight, & other causes.

(3) A long enough stay in the body. Against this we have several protections. The upper air passages are much folded in their surfaces, and arrest the bacilli; some of the cells are ciliated and carry them out and if they reach the lung they may be weakened-er than the cells.

Conditions for the patient:-

(1) An inherited disposition. This is sometimes known as the phthisical habitus.

(2). Weakened power and resistence.

(3) Some injury to the tissue E,g. action of dust on the lung. The lung have a higher resisting power as is shown by the relative immunity of the lower lobes and the many healed lesions of the upper lobe, hence we may group tuberculous patients into four main classes:-

(1). Where there is infection without dispostion. Hence the numbers and virulence of the bacilli may overwhelm a strong system, or if weaker a few may make a local lesion, which tends to heal.

(2) Infection with an inherited disposition. About 60% of all cases give a family history of the disease and show the habitus. This means shallow, narrow thorax, sunken supra-and infra- clavicular fossae, long slender neck, imperfectly developed muscles, and can-niculus adiposus. Children of this type where bacilli are numerous almost never escape.

(3) Infection with an acquired disposition, favored by unsanitary surroundings as in certain trades and by other disease with long convalescence, like typhoid or profound metabolic effects like diabetes.

(4) Infection with both congenital and acquired disposition. They often succumb with startling rapidity.

Lecture XIV. 2-20-07.

Consumption is commonly at first a localized disease. It occurs oftenest in the lungs, alimentary tract and skin, e.g. in parts most easily reached by the bacillus. Socalled cryptogenic cases occur as primary lesions in the bones, joints, brain, etc,

The bacilli may enter a lymph or blood channel and leave no trace at the point of entering. When localized the lesion usually begins as milliary nodules; sometimes singly or in successive crops. Between the nodules the tissue may show no reaction or there may be a good deal of inflammatory infiltration as is common in the skin. Where the part is well supplied with vessels the new granulation tissue may be red or fungus or contain special foci of tubercles. The lesions extends by involving lymph channels for short distances, setting up small resopption tubercles and leading to necrosis of parts between. It may spread also to a distance thro lymphatics and vessels then one small tubercle in the Thoracic Duct may soften and send bacilli into the venous current and so over the whole body.

In early years of life bones, joints, and lymph nodes are especially effected; in adult life the lungs are often fitst attacked. But no tissue is exempt.

The general systemic effect will depend on the site of the lesions, thus a small focus in the brain or cord may be fatal, while one of the same size in the skin may be unimportant. Occasionally a focus, as in the lung becomes encapsuled and partly calcifiedand may remain quiet for years and is then called latent tuberculosis. The other extreme is shown when all the organs are involved by many bacilli, as an acute attack. This is invariably fatal.

In many cases the serious symptoms are due in part to the tubercle toxin but far more to a secondary pus infection, which complicates it. Thus inconsumption of the luns, the weakness, anemia, emaciation, afternoon fever, and night sweats, are due t o the secondary pyogenic infection, rather than to the tubercular.

The source of the human tuberculosis may be from some of the lower animals, for cows, horses, pigs, etc have it.

The common terminations of a tubercular lesion are three or combinations of them:-

(1). The part may be indurated by fibrous hyperplasia, and the new con. Tis. may be poor in cells, like a scar, or more cellular producing typical tubercles.

(2). The fibro-caseous. Large firm cheesy mass es are found, as in the nodes, adrenal, spleen, and brain. These often act chiefly by th eir pressure effects like a tumor and are important in the brain and cord.

(3) Softening may occur. The caseous necrosi passes into liquifaction necrosis. Thus we have cavities, cold abscesses, fistulae, and large ulcers. Cavities are common in the lung, kidney, nodes. Vessels which cross them may be croded and break causing hemorrhage, but often the lumen is obliterated before the rupture occurs. The wall of the cavity is lined with a necrotic granulation tissue, with tubercles scattered thro it, and from the pyogenic infection may be kept up a constant discharge of pus for a long time. If any canal, like a bronchus, can empty the cavity it may contract; if it cannot empty the contents may thicken and calcify and be inclosed by fibrous tissue.

Tubercular ulcers are common on mucous and skin surfaces, have thick rough edges but little undermined and uneven floor. In the young the special form of tuberculosis known as Scrofula occurs usually from the second to the twelfth year and involving the lymph nodes especially. These nodes swell and become hyperplastic in group. and may be very hard from fibrous increase. If they soften and suppurate they usually discharge thro the skin and may leave fistulous tracts for a time. The patient may then be immuned for the rest of his life. These children often have various skin diseases, enlarge me nt of the tonsils and chronic inflammations on one or more mucous membranes at the same time.

Tuberculosis of the skin. has certain perculiar features. It occurs in many form, the three commonest are:- Lupus Vulgaris, Tuberculosis verrucosa cutis; tuberculosis vera cutis.

Lupus vulgaris. This begins as a small red spot of granulation tissue which tends to make fibrous tissue and is very slow in its course. Plasma cells and lymphocytes occur; giant cells are scarce and so are the bacilli. The ulcer frequently breaks down at one side while it shows efforts at healing on the other, and then the healed parts may soften-

It is most common on the face, especially about the angle of th eye, and lips and the nostril. From the latter two places it may invade the laryxn.

Tuberculosis verrucosa cutis is commonest on the hand from direct inoculation. The whole cutis and subcutis are infiltrated, there are but few giant cells or bacilli.

SYPHILIS.

Syphilis is a disease peculiar to man which cannot be transmitted to the power animals except the apes. It is due to an organism which has two names, Spirochaeta pallida or treponema pallidum. This is found in most of the lesions both congenital and acquired syphilis, except in the tertiary forms. It is a spiral organism with from 4 to 12 distinct turns, slender, smooth, narrow, and perfectly regular. It is commonest in the lymph spaces, either singly or in groups. Syphilis is always described in three stages:- Primary secondary and tertiary

In the primary stage we hve the initial lesion, or the initial sclerosis or the true or Hunterian chancre. This specific sore developes at the point of inoculation in from 2 to 6 weeks after

exposure. At first it is a papule, with a red moist surface. ~~xxx characteristically hard~~ It is characteristically hard and may be lifted from the tissue beneath. Later on there may be a secondary infection with a pyococcus and then you have shallow ulcer, with sharp si des, not undermined, on an indurated base.

Microscopically there is a dense infiltration of plasma and mast cells, lymphocytes and a few giant cells along the edge. This cellular infiltration explains the hardness of the sore. There is also proliferation of the endothelia in the vessels and lymphatics of the part, which may partly or entirely close them, and the changes in the vessels are the essential changes. As the sore developes the nearest nodes swell and make the syphilitic bubo. This is seldom painful, not firmly attached to the skin and very seldom suppurates. The chancre is formed usually on the external genitals, but may appear on other parts and is then called and extra-genital chancre. With the primary stage there are often slight constitutional symptoms. Among these is the primary rash, which is usuall slight reddening of the suface in diffuse patches, and the patient almost ne ver notices it. It may invisible unless the skin is first rubbed of slapped and may even then be more distinct in a photograph than with the naked eye observation. There may be slight fever etc, but the systemic effects are triffling. Taking the whole of the primary stage at duration fr om infection to the chancre is usually about four weeks and from there to the constitutional symptoms of the secondary stage is from 6 weeks to 5 months,

The term primary is usually applied to the time between the sore and the secondary symptoms. The lesions of secondary syphilis are of two varieties:- the inflammatory hyperplastic; and the degenerating neoplastic. In appearance they var y greatly and constitutional symptoms are often serious. These include high fever, often intermittant, anemia, inflammation of the eye, falling of hairy and certain skin eruptions. The name given to all these skin eruptions is syphilide. This syphilide is usually papular but at times vesicles and pustules may occur. Where the skin is moist the mucous patch is common = Plaques Muguese.. This is commonest about the perineum, the inguinal regions, between the toes, at the corners of the mouth, on the tongue, and the inner side of the cheek. The papillae of the skin or mucous surface are enlarged and they make a slightly elevated patch and the heat and moisture keep the surface and grey. These are among the most dangerous sources of infection for others.

On page 17 Lecture IX, first sentence, should read"Before the processes of repair, which begin after inflammation, absorption of the exudate is necessary."

Lecture XV. 2-27-07.

Skin lesions in syhpilis continued.

At times the skin lesion is very large and elevated, it is then called a broad condoloma, or in Latin, Condoloma Latum. It is most common about the anus, vulva, and inner side of the thigh, where moisture, warmth, and lack of cleanliness and the irritation of the clothes irritate the papillae to an enormous enlargement. They oedematous and infiltrated with plasma and mast cells.

About two years after the secondary the tertiary develope and while the secondary affect surfaces chiefly, these attack the deeper organs, and none may escape. The characteristic lesion is the Gumma, or syphiloma. These are tumor like growths of connective tissue with a great tendency to caseous and other degenerations.

In the gross a gumma is a mass of dry caseous tissue, surrounded by a connective tissue capsule and these occur singly ot grouped or sometimes arranged serially along the vessels. If softened and absorbed they leave tough radiating scars.

Microscopically we find fatty matter, dead cells, and along the egges diffuse staining where the chromatin has been washed out of the

dying nuclei by the lymph stream. It differs from tubercular caseous foci in three points:- it has fewer giant cells; more fibrous tissue running thro it; and no tubercle bacilli.

The local vessels are thickened or occluded or some are newly formed. On a mucous such a caseating gumma may break down into an indolent ulcer. In the cranial bones they may soften and perforate; in the brain they may act as tumors, with severe pressure effects and they are common in the Spleen, liver, and kidney.

In size they vary from points which are just visible, to several centimeters in diameters. Beside the gumma, there are in the tertiary stage, numerouls lesions called parasyphilitic, because they are indirectly due to the syphilitic bacillus, su ch as thickening of arterial walls, fibrosis in organs,and on serous surfaces; degeneration and sclerosis in the cord and eruptions on the skin.

The congenital form of syphilis affects the foetus in the uterus so that it may die long before birth or be born prematurely, or die in the first year or so with diarrhea or other diseases. Some of these cases born dead, or dying soon after birth show gummas in the organs. Other lesions in such children are;-white pneumonia, indurated spleen, pancreas, etc. diseases of the bones and joints and various skin lesions. The upper middle incisors of the second set of teeth are frequently notched on the cutting edge and the other teeth may be distorted and peg shaped(Hutchingson's teeth).

The skin eruptions in syphilis have certain features in common;-(1) Coppery red color; (2)-situated about the mouths of mucous canals; (3) common on extensor surfaces; (4)- in circles or parts of circles,e.g.,lesions tend to form circles; (5)- Polymorphism; (6)- but little itching; (7)- thick crusts. The above are not diagnostic, but the following are:- (1)- sharply circumscribed, dense, uniform infiltration of cells affecting the papillae and corium; (2)- these cells are unable to make permanent tissue, and hence dispppear by necrotic and suppurative shanges; (3)- hence there is a tendency to centrifugal spread from a necrotic center.

Leprosy

This is an infectious disease, of a very chronic course in conditions of bad sanitation, distinguished by the production of granulation tissue under the influence of the lepra bacillus. From the fifth to the 14th century all Europe was afflicted with leprosy. It then began to yield to syphilis or great pox. Now we have it only in scattered places. At present the Sandwich Islanders, the Swedes, No rwegians, and Chinese are the most affected by Leprosy.

Prodromal symptoms may last months or years before the disease begins. Among these are lassitude, anorexia, diarrhea, ~~phenigus~~ Pemphigus and slight fever. These are no guide to the form which the disease may take nor to its severity. There are three main types of lepra:-- Macular, tubular, and the anesthetic, and the mixed. A special form is called Lepra Mutilans when the small joints of the fingers and toes are lost.

Macular, a constitutional disease of chronic course involving the skin, mucousmembrane, and nerves, with red and brwon spots, difuse and nodulent, with infiltration in the skin, which may break down into ulcers and similar lesions in the organs, Hyperesthesia, and anaesthesia, and fatal by a specific cachexia or by an intercurrent disease.

In about 30% of the cases death is due to tuberculosis; in about 52% to kidney disease; The bacillus was discovered in 1880 by Hansen, it is very resistant and will stand drying for ten years, occurs in the sputa, the mucous discharge from the nose, rarely in the feces. In the granulation tissue it occure both free and in special large lepra cells. It has never been cultivated, cannot be inoculated into animals and human inoculations are so far negative. Heridity is of little importance. The claim that a diet of fish, without salt, such as the poorest would adopt favors its

development. In Hawahii it is considered contagious, but feebly so. Syphilis disposes to it and cases have been due to infected vaccine. The white race is almost completely immuned. There is no cure for it, but Chaulmoorgra oil (crude) has given the best results.

(2)- Nodular or tubercular. The lesion is slightly raised, irregular in outline, has a shinny surface and a coppr red color. There is hyperemia of the cutis with some oedema and infiltration with cells. These lesions may fade out and return later. The face is commonly attacked first; the eyebrows, forehead, malar prominences, and lobes of the ears especially. If the first crop vanishes a second follows it and there is some fever, then you have the lepra tubercular form. This begins as one or more papules a m.m. or two in diameter on the site of the previous red spot or elsewhere. The papule is tense and shinny, of a reddish brown in blonds and darker in brunnets. The vessels are much congested, the sebaceous openings are large, plugged with dirt, and hence speckled with black dots. It spreads to the rest of the body but the palms, axillae, chest, abdomen and soles usually escape. The hair falls out, especially from the eyebrows, and the nails become flaky, and are lost. With the eruptions there are also special thickenings of the skin and the adjacent lymph nodes are enlarged and hardened. If the conjunctivae are involved the eyes may too large for the lids to cover them, this is extremely painful and leads to blindness. The nodules from in the tongue, gums, and larynx, the voice becomes feeble and harsh. The patient has a mucous discharge from the nose which contains countless bacilli. The disease often starts from picking the nose and infecting the nasal mucosa.

The fully developed nodules cease to be painful because of changes in the sensory nerves. The nodules may be stationary or breakdown into ulcers and with each new crop there is a fever of a bout 103 degrees, and the lymph nodes are enlarged and are tender. The hands and feet become distorted, sensation in them is lessened, hence the nodules are easily injured and make ulcers which do not heal and are covered with largel bleeding granulations.

A perforating ulcer is common on the sole of foot and may even extend thro it. The face has a peculiar lionine appearance and the scarring about the mouth and elsewhere disfigures the patient. These patients die in months or years; commonly about 6 years after the disease begins. In the most rapid cases there may be gangrene, pyemia; the slower dying from tuberculosis, nephritis, and exhaustion.

(3). The anaesthetic from sometimes called smooth lepra, or Danielsen's disease. The patient is usually older, about 30 years, The first symptoms are shooting pains along a nerve or numbness & lack of power & and injury may result from the imperfect sensation. There are often whitish sptos called Leucoderma, and with these may be red macullae. The musculo-spiral and Ulnar nerves are often first attacked. There may be contraction of the fingers, claw-hand drop wrist, flat foot, and other nervous anomolies. Effusion into joints and destruction of cartilage may cause spontaneous dislocation. The bones of the fingers and toes may die and are broken and are cast off Ulcers on the knees and elbows are common and also the painful plantar ulcer.

Mixed cases combine all these lesions in different proportions. In any case the liver and spleen and other organs may show nodules or hyaline changes from the chronic suppuration.

Of the clinical symptoms macullae occur in 89%; nodules in 74%; loss of eyebrows and lashes in 63%; atrophich changes in the hands or forearms, contraction of the fingers and enlarged Ulnar nerve 32%; plantar ulcer in 16%; Elephantiasis of hands and feet in 16%; and facial paralysis in 11%.

Pathology of lepra. In persons whose skin is a good medium the bacillus causes the leproma or nodule. These are from a few m. m. to several c,m. in diameter, spherical and of a transparent yellow, which are light or dark according to the pigment present. While growing they are as hard as cartilage. On section they are very anemic, smooth and dry, and have a waxy look. The skin over them is not movable. Those of the subcutis make firm spherical tumors which are slightly movable underthe cutis. They may be primary but are commonly secondary to those of the cutis. In bothe forms atrophic and softening changes occur in time.

(Leprosa continued)
They contain numbers of graunlation cells in which the plasma cell is important and is usally called the lepra cell. It is constantly vacuolated and contains the bacilli. There are a few lymphoid and epithelioids and occasionyy giant cells which are not so typical as in the tubercular lesions. This granulation tissue is well supplied with vessels consequently the productive and degenerative changes in it are slow. The infiltration in it begins about the vessels of the skin as soon as the bacilli leave the vessels, The lymph xxxxxxx spaces and vessels become filled with bacilli and w here these gather in mass it is called a globus (i). Smaller groups i n spindle shapes and occasionally 12 or 20 are common, especially where the vessels branch. The bacilli stay below the epithelial layer, perhaps because sensative to cold, but with suppuration and other inflammatory lesions added, they may invade theepidermis. The hair follicles are often invaded, sweat and sebaceous less frequently. But the latter may be compressed and atrophied from the pressure o f the cellular exudate. The vessels show thickened walls and narro wed lumen and the pressure of the growth from belowmay cause theepithelia to scale off, leaving an ulcerated nodule. The bacilli on this may be a x source of infection. In some cases the bacilli break into fragments and disappear, in which nothing characterisitic can be found. If this is a general process spontaneous cure may result, and only the lack of sensation will remain. Such a cure is very unusual.

In the anaesthetic form the sensory and afterw ard the motor nerves and involved, perhaps because the skin is no t a good medium. The bacilli occur in the endonurium and perinurium and spread along the nerve centripically. Certain special nerves may be attacked first and the Ulnar, Mediam, Tibial and Perioneal. First the axiscylinder degenerated after a period of great sensativeness then the neruitis becomes interstitial and causes great thickening of the nerve trunk. There may be coarse fusiform thickening along it, a nd on section these nodes are greyish red or yellow, from fatty changes, or gelatinous from mucoid degeneration. Where the nerve is superficial, as the Ulnar behind the internal condyle of the Humero us, it may reach four or five times its normal size.

Microscopically the axiscylinder is broken up , there are lepra cells and bacilli in the sheath, marked fibro sis, and in the old cases nothing but scar tissue. The lymph nodes may show similar changes, the spinal cord may be sclerosed, mucous surfaces and the large organs may show nodules and infiltration.

The average duration of the disease is six years for the nodular form; 10 years for the anaesthetic; and 9 years for the mixed.

Actinomycoses.

This si due to the ray fungus, to which both diptheria, galanders, and tuberculosis xxx organisms are related, for they all produce true branching forms at times, and they all resist drying. Actinomycoses is at present a disease of cattle and horses, probably derived from sproes in grain.

It may enter the human system in one of four ways:- (1) by inhalationm (2) by swallowing; (3) thro wounds; (4) thro cavities in the teeth.

Hence the mouth and the naso-pharynx, the organsof the respiration, the alimentary canal, or a solution of continuity in the skin are the usual points of xxxxxx attack, and other cases are cryptogenic. Among human beings the disease is rare.
There are two main types of fungus:- Actinomyces bovis = in cattle; and actinomyces hominis = in man. It occurs most among those who handel cattle and grain. Possibly the spores are transmitted by the air, water or soil. The direct transmission from the sick to the well is possible experimentally, but very improbable otherwise. Being an occupations disease it is most common in males in the proportion, at least, of 3 to 1.

The part affected in order of frequency is head and neck; abdominal organs; lung; tongue; and skin. The fungus produces a hard nodule which enlarges and softens. When well developed four zones can be distinguished:- (1) a central part containing irregular filaments, coccus forms and involution forms; (2) outside of this a ring of radiating filaments, starting from a common center; (3) and

outside of thsi a ring of clubbed ends with filaments between them; and (4) and about all a zone ofpus, giant cells and fibrosis, which may make a kind of capsule. When once started the n eighborhood is steadily invaded by fungus and granulation tissue, and the latter either makes scar tissue or breaks down. So the le sion may be healing on one side, and progressing on the other. It spreads by contiguity and by making metastasis at distant parts. At times there is a single form of very slow growth, which may be encapsuled and healed. The nodes are not especially involved.

The pus from these lesions is characteristic. It is very sticky and contains little granules and a bright sulphur yellow. These are greenish by transmitted light. On teasing them in salt solution we find inflammatory cells (polys), threads of fungus, bulbus refractile bodies, which are the clubbed ends and cocci. Hence the diagnosis is easy, shake some of the pus with salt solution and find the granules.

In the viscera the lesions vary with the acutness of the attack the structure of the tissue affected, and the presence of a secondary infection, as by a pus organism. The lesion may be small as pin points, or several c.m. in diameter, they are usually spherical, but may any shape from the pressure and the softening. The more chronic the lesion is the greater is the amount of the fibrous tissue and this amy be pigmented. On washing out the salt material a peculiar spongy mass is left.

In the lung the lesion is easily mistaken for the tubercle.

The skin may be infected primarily thro a wound, or secondarily from a nodule beneath, as in a bone. With primary infection there may be a fungus mass above the level of the skin, dark red, soft and not tender. This breaks down into a ragged ulcer with much undermining of the edges. With a secondary invasion of the skin there are numerous fistulous tracts leading down to the focus, and these continually discharge pus and sulphur granules.

In bones there is a combined destruction with a formation of new irregular bone. This new bone is arranged in a coarse net work in whose meshes we find the necrotic tissue and the fungus. This is common in cattle in the lower jaw, hence the disease is known as lumpy jaw.

The greater mass of the tongue may be converted into scar tissue, hence another name for the disease is "Wooden-tongue".

Glanders

This is an occupation disease due to the bacillus Mallei. It is an occupation disease affecting those who handel horses, hides, hoofs, etc. In horses the inflammatory nodules are commonest in the mucose of the nasal passages. Man may be affected thro some wound of the skin, most often on the hand or arm, or more rarely by inhalation. In man there are two forms of the disease:- Farcy, and glanders.

In farcy there are small nodules under the skin, along the lymphatics, most numerous near the place of infection.

Typical glanders attack the mucosa of the respiratory organs, and is usually subacute or chronic. On a mucous membrane, as of the nose nodules form, composed of leucocytes and epitheliods. These rapidly break down into spreading ulcers and where these join the destruction of tissue may be enormous. The floor of the ulcer is rough and from and covered with shreads, and from it there is a free discharge of pus. The nodules involve the larynx, lung oesophagus, and stomach if the case lives long enough.

In the organs as the liver, spleen, testis, between the muscles, and in the skin and joints, either glanders form or there is suppuration. Such lesions seldom heal, or if the do they leave irregular stellate scars.

Local hyperemia is severe with numerous hemorrhages; foci of coagulation necrosis and softening may form and when a mucous membrane is involved there is a discharge of acrid mucous, which may irritate the skin; bacteria are numerous in the granulation tissue with many pus cells.

The best method for determining the diagnosis is to inject some of the pus into the peritoneum of a male guinea pig. By the sec-

ond day the testicles are swollen; by the ~~fifth~~ fourth they are necrotic and the bacillus may be recovered from the m in pure ~~cul~~ cultures.

The most charactic growth is on potato as a reddish brown mass with a peculiar discoloration of the medium. The organism is extremely dangerous to handle. Several deaths have occured in the labratory from accidental inoculation.

Finale.

Thanking my patrons for the kindassistance and interest they have taken in a worthy cause, and hoping that they will all be successful, I am,

Yours truly,

M.H.B.

SPRING TERM PATHOLOGY NOTES.

Outline for tumors.

I. General considerations.
1. Meaning of the words "tumor" and "neoplasm"
2. Excluded are:-
a. edematous swelling.
b. purulent infiltration and phlegmons.
c. hypertrophy and hyperplasia.
d. excessive regeneration.
ee inflammatory new tissue .
f. infectious granulomata- here there are new cells in foci and also metatases, but the cause is a special external stimulus.

X.

3. Definition of tumor and other terms, homologous, heterologous, heteroplasia, etc.
4. Morphology of tumors-
a. Gross.
1. Form { External / Internal
2. Mode of growth. { Central. / Infiltrating or appositional.
3. Consistence.
4. Color.
5. Retrograde changes { Cause / Varieties.
6. Section.
b. Microscopic.
1. Interstitial substance or stroma.
2. Parenchyma.- importance- mode of growth; relations between stroma and parenchyma; vessels, and nerves, etc.
5. Classification.
Three main groups. { Con. Tis. Most important. / Epithelial tissue most important. / Mixed tumors.
6. Development.
a. From normal tissue.
b. From cells which lack normal relations, - str oma starting wrong in embryo, or misplaced later.
c. Tissue originally normal, after alteration by various lesions, as injury, inflammation, etc.
7. Growth.
Each tumor grows from its own cells exclusively.
Rate of growth.
Life periods where growth is rapid.
8. Metastases- protopathic & deutropathic tumors.
secondary tumors in some organs, regions, or body.
Primary multiple tumors, of one kind or many.
Secondary " " by metastases, either local regional, or distant.
Metastasis thro lymphatics; influence of nodes.
" " blood vessels, malignant thrombi.
Parenchyma cells alone make metastases; secondary tumors.are like the primary microscopically, but not necessarily in the gross. Retrograde metastases; other modes of spreading, by implatation, continuity, or by contiguity.
9. Recurrence, chiefly in malignant forms.
Variety, transplantation.
Time and causes of recurrence.

10. Effects of tumors on the general condition depends on:-

a. Importance ofpart.
b. Size of tumor.
c. Condition of tumors.
d. Position " " .
e. Mode of growth.
X. Tumor cachexia composed of several factors.
Benign and malignant tumors- their characteristics clinical, gross, and microscopic.

11. Healing.
12. Etiology.----- chief theories:-
a. Heredity.
b. Spermatic.
c. Virchow's = local irritants.
d. Cohnheim's = fetal remnants.
e. Parasites.
f. Hausemann's= anaplasia.
g. Ribbert's = tissue tension.
h. Adami's = habit of growth.
i. Rindfleisch's = nervous control.

II. Varieties of tumors.
A. Starting in con. tis.
1. Of mature type.
2. Of immature type.
A-1. Resembling mature con. tis.
1. Fibroma.
a. durum.
b. molle.
keloid
elephantiasis.
2. Myxoma.
a. of mucous membrane.
b. of nerves.
c. chorionic villi.
3. Lipoma.
44. Chondroma.
a. from peri- and endosteum.
b. ecchondroma.
c. enchondroma.
5. Osteoma- osseous new growths excluded (5),
according to site:-
peripheral
cortical
according to structure:-
osteoma medullary (spongiosum & medulosum)
osteoma durum and eburneum.
6. Angioma
a. hemangioma- simple and cavernosum.
b. lymphangioma " " " , & cysticum.
7. Myoma
a. leio-myoma.
b. rhabdo-myoma.
8. Neuroma.
9. Glioma.
10. Endothelioma.
a. hemendothelioma------ & 4 varieties.
b. lymphendothelioma--- & 6 " .
n c. of serous surface.
A-2. Resembling immature con. tis.
Sarcoma- definition- stroma- parenchyma.
Varieties:
a. with immature cells:-
Small round cells.
large " " .
small spindle cells.
large " " .
giant cells.

Varieties.(Cont)
b.with more mature cells.
fibro-sarcoma.
lipoma.
chondro,
osteo
angeo.

II-B Epithelial tumors.
1. Of mature type.
a. from investing epithelia- papilloma (hard & soft)
b. from glandular epithelia- adenoma(true, cystadenoma and papillary) ".

2. Of immature type.
a. carcinoma or cancer.(definition, stroma, parenchyma, cells, and nuclei.

varieties:-
1medullary or encephaloid.
2scirrhosis or fibro-carcinoma-- studied as:-
external surfaces etc.
carcinoma of mucous " .
great glands.
3 carcin. simplex.
gross appearances; spread of carcinoma; clinical facts.

b. hypernephroma- benign and malignant.
c. chorionis tumors " " " .

II-C. Mixed tumors
Composed of many tissues.
congenital origin.
Most important examples = Dermoid cysts & branchiogenic cysts.

3-20-07.

TUMORS.

When we use the term tumor or neoplasm we have to exclude some things as simple swelling of tissues, either from fluid in their meshes, or diffuse infiltration of pus, also collections of normal or pathological material in cavities. The same is true of hypertrophies and hyperplasias. Many tissues have some power of regeneration, and among pathological cases of this some are possibly complete, as in the nerves; and others are incomplete, as in the mucous membranes. This process of regeneration may be typical or not, according as the tissue replaced resembles the normal. The regenerative process may follow the embryological pattern and make tissue like the normal. More often it ends in less specialized tissue The stimulus to the new and rapid growth of cells may be either external and internal. Frequently the multiplication of cells does not cease with the repair of the defect. If they go on growing we may have a transition from the inflammatory new growth to a true neoplasm (tumors) e.g. as is seen in proud flesh in the healing of wounds. Chronic stimulation by mechanical, thermic, bacterial and other agents may modify the rate at which the cells multiply and also the type. Examples are common in mucous membranes, where polypi are formed, and in fibrosis of organs, where some cells atrophy, with hyperplasia of others. All such growths are excluded from tumors.

The infectious granulomata more nearly resemble neoplasms. In these there is a microorganism which stimulates the tissue mechanically or chemically. The response which the cells makes is increase in their numbers, peculiar grouping, and rapid regeneration. In these lesions two facts are worth mention:- (1). that there is usually an attempt to form new tissue about the focus; (2) that the action of the toxin, and the changes in the vessels determine the death of the new tissue. It does not become

mature; it lasts a short time; and then suffers necrosis.

In these four cases, e.g. healing of wounds, hyperplasias and hypertrophies, regeneration of lost tissue, and infectious granulomas, th e important element is the stimulus which starts the process, and the formation of new tissue is secondary, for the purpose of healing. Further in the infectiousgranuloma there is metastasis by which they may be carried from kind oftissue to any other distant part of the body. In this case it is the cause which is carr ied, setting up changes in cells where it lodges. In the metastasis of tumors it is bits of the tumors themselves which are transplanted, and where they lodge they form a new tumor out of themselves, while the proper tissue cells are destroyed.

The following five characters are common to nearly all tumors:-

(1) They begin apparently without cause (Spontaneously)
(2) From the first the new tissue is independent, pushing other tissues aside, causing their atrophy, invading and replacing them.
(3) The excessive growth of new cells is purposeless.
(4) The new growth is either self-limited or without limit.
(5) The cells, stroma, ve ssels, and lymphatics in the new tissue may show both quantative and qualitative variations from the normal; they tend to be atypical, and the difference in quality is always towar d a lower, less specialized condition.

Definition:

A neoplasm is a spontaneous, progressive, localized, non-inflammatory, relatively functionless, more or less atypical development of new cells.

If a tumor in its structure resembles normal tissue = Homologous; if it differs widely from the normal = heterologous; (these are the most malignant).

Morphology of tumors. Under this we include all the gross and minute characters found in tumors.

Gross. The form which the tumor takes depends upon the conditions of pressure under which it grows, and also it own peculiar plan of growth. If ona surface, where its extension is opposed only on one side they are seen to project and make a polypus. Their weight and dragging may pull them out to make a pellicle and the main tumor hangs below. If deep in the tissue they are usually spherical, because this shape unites the largest amount of mate rial wi th the smallest space.

As to the internal plan- some tend to become circumscribed, no matterwhat conditions surround them; others never have any sharp boundaries, and this is of the utmost importance for diagnosis and prognosis; hence we require two forms of growth:- th e central and peripheral. In the central growth the tendency is to make nodules, milliary in size or many C. M. in diameter , which enlar ge in all di rections equally, and push other tissues aside. In the peripheral or appositions the tumor grows most rapidly along its margins: hence the cells are younger, wi th more mytotic figures, and richer in chromatin. Such infiltrating growth continually reaching out into any spaces and channels present in the normal tissue, or makes them for itself, hence lymph spaces and channels, arteries, veins, gland ducts, nerves and lines of fasciae, have columns of cells guided along them. These invading columns multiply at the end and so push further and also on the sides, dilating the space and compressing the normal cells. The continued pressure atrophy, pressure on the vessels: and the toxic products lead to the death of the invading tissue and its replacement by tu mors. If they project with coarsely or finely divided surfaces they make fungus or cauliflower growths; if the main tumor has little projections from it = a papilloma: if those are small = a wart or verruca: if they are large and branching = deudritic or tree like,

In consistence tumors vary between the soft kinds or medullary, and th oseof bony hardness called scirrhous. In the hard or soft

tumor there may be fluid or semifluid parts = cystic.

The color of tumors depend upon the proportion of ve ssels to th e whole mass; the supply of blood, arterial and venous; the presence of hemorhages; pigment;degeneration, suppuration, etc. The color is important in a few tumors which start in tissues which make pigmat, as in the eye and the skin. Those often contain quantities of brown and black pigment and are called melanoma.

Retrograde changes in tumors are liable to many forms of degeneration. This may be due to the mass of the tumor growing faster than the vessels can increase to nourish them, or it may press on important vessels and occlude them: or its own vessels may degenerate, or the secretion of its own cells may be ferments, which destroy the cells of the tumors. With fatty changes we find yellowish tumors, and the fat may be distributed in a coarse net work following the vessels. With hyaline, colloid, and mucoid changes the tumor may be shinny, transparent, and gelatinous. Calcification and rarely osefication may occur. The new bone being usually in thin plates and splinters, sometimes making a shell for the whole tumor . Edema is very common and either alone or with other changes makes larhe soft tumors in which further chages may occur rapidly. Hence in the older parts of the tumor we find combinations os swelling, clot, blood and other pigment; degeneration and cystic cavities. Over the degenerated parts the surface may fall in and this is called umbilication. This is of value is diagnosis of cancer of the liver where you can sometimes feel the umbilication thro the abdominal wall. In many tumors shrinking from scar formation is common, as seen in cancer of the breast, where the entire nipple may be drawn in by the contraction.

In superficial growths ulceration is common because they are liabelto injury and thei r tissue are less resistant to infection. This ulceration may accur without injury. When the tumor has many large vessels and the ulceration is deep the severe bleeding and suppuration exhaust the patient, especially since the tumor enlarges more rapidly on reaching the surface where there is no resistance. The form of the ulcer is often called crateriform or palisade, for on the well side it rises sharply, sloping gradually to the ulcer in the middle.

The base of the ulcer may besmooth or rough, granulating, fungus, partly scarred over, or covered over with necrotic tissue and pus. On such a surface bacterial invasion is the rule; the commonest germs being those of suppuration and putrifaction. The absorption of the dead an d liquified tissue and bacterial products may cause severe constitutional intoxication.

3-22-07.

Groos structure of tumors. On section of a tumor we can often recognize much of its structure in the groos. When the stroma appears arranged in distinct lines we call it fasciculate; when bundles of tissue are woven in various directions or net-work= reticulate. When the arragement in in alveoli, whis is most distinct in cancers, and makes a finely lobulated edge. When parts of a tumor are fluid in well defined cavities it is called cystic. If these are small we use the word spongy; if of medium size = multilocular; if there is one main cyst = unilocular.

Microscopically tumors consist of an interstitial substance with cells arranged in its spaces and vessels for nutrition which run in what corresp onds to the stroma. In many forms it seems as if but one kind of tissue were present, those used to be called histoid; in others the arrangement of parenchyma and stroma is like that of a great gland & those were called organoid. These are given up, for the simplest tumors have both stroma and parenchyma. The proportion between these two varies greatly, so that with much stroma you have a firm serous tumor, and with praenchyma chiefly present you have soft, medullary or encephaloid. The parenchyma of any tumor is always its most important element. It may consist of any variety of can. tis. or any variety of epithelia, or varying mixtures of the two. No matter how much the parenchyma resembles the normal con. tis. it always presents differenc

es and these are more distinct in proportion as the cells are immature. The parenchyma may retain some trace of the original function of the tissue, hence in sarcoma we find the cells making delicate intercellular fibrillae; in other tumors, catilage, bone, or pigment may form; epithelia may make mucous and bile and those from the surface may make horny cells. In rare cases this retention of function is thought to be of value to the body. The examples given include:- tumors of the thyroid without myxedema; tumor of the adrenals without Adison's disease) and ~~X~~ tumor of the pancreas without diabetes. This view is open to criticism, e. g. tumor of the pancreas usually involves the head of the organ while the islands, which control the metabolism of sugar, are most numerous in the tail of the organ.

The increase in parenchyma cells occurs in three ways:-(1) by direct mytosis; (2) by indirect mytosis; (3) by nuclear fragmentation. but the last is usually a degenerative process. The variations from normal mytosis include tripolar and multipolar forms, irregular and superfluous monasters and diasters, etc. Such forms are most common in the malignant tumors and have to do with the extraordinary rapid growth.

The stroma shows fewer abnormalities. In many tumors it consists of con. tis. with ~~mexhxw~~ vessels and this con. tis. may be newly formed or what remains after the cells previously present have disappeared. The latter is most common with the infiltrative growths. the kind of con. tis. varies in quantity and quality. It may be muscle or bone, white or elastic fibers, remnants of previous tis, and the muscle may be either stripped or smooth. With a preformed stroma we often find signs of irritation, as the tumor invades and it becomes infiltrated by luecocytes, and may even resemble granulation tissue. With bone or muscle present the tumor is sometimes called myoplastic or osteoplastic.

The relations between the parenchyma and the stroma may closely resemble the nromal; thus the investing epithelia will cause the tissue below to make papillae, or if present to enlarge. This is seen in some inflammatory conditions as well; as where a fistulous track b ecomes lined with epithelia, and below this papillae form. A good example with tumors is where a papillary oedema of the ovary becomes implanted upon the peritoneum and beneath it papillae begin to form. When muscle is invaded its nuclei may become very numerous, and then it degenerates. When fat tissue is invaded its stroma becomes very thick, and the fat disappears. In epithelial tissue while the tumor is invading the epithelia may proliferate, either as an effort at repair or as an inflammatory hyperplasia. The storma supports the tumor and carries the vessels which nourish it. These may be very large and numerous like the normal or with dilitations with almost no walls, or with very thick ones. The same is ture of lymphatics, but these in most tumors, are scanty and imperfectly developed. The blood vessels are partly newly formed, partly left over from the previouls tissue. Their walls are apt to show hyaline and fibrous changes; they often rupture or contain thrombi. Frequently the growth of the vessels is unable to keep pace with the growth of the tumor and this exppains many degenerations in them.

It is not positively known whether tumors have nerves of their own. Tumors may begin in the sheaths of nerves and with infiltrative tumors the previous nerves may remain and probably vaso-motor fibers accompany the large vessels, but more than we do notknow.

The groos and microscopic characters do not furnich a satisfactory basis for classifying tumors. Until we know the cause or causes of tumor formations all classifications are imperfect and temporary. We have to use the histogenetic method, e. g. group them according to the tissue from which they ar ise; hence we have three main classes:- (1) those where con. tis. is most important; (2) those where epithelia is most important; (3) mixed. Under each of these heads we can usually distinguish a benign form and a corresponding malignant form, e. g. a benign tumor starting in white fibrous tissue will make a fibroma; a malignat one from the same tissue will make a spindle cell

sarcoma or some other form. One which starts in epithelia and resembl es glands is an adenoma; the corresponding malignant one from the same tissue is the carcinoma.

As to the development of tumors. It is not known whether normal tissue without becoming diseased or disordered can give origin to a tumor, but it is against all biological rules that a tumor should start from normal tissue. Hence we must assume that a tumor must ar ise in cells which do not have normal relations, either functionally or structurally. This may be because the cells did not start properly in the foetus, or that they become misplaced later; another possibility is that cells originally normal should so alterate by injury or other agency that a misdirected proliferation begins in them, ending in a tumor. It is usually taught that examination of the growing edge will explain its origin, because the cells are youngest and most active there. This is seldom the case; it usually shows only how the tumor spreads, not how it arises.

As to growth of tumors. Every tumor increases by the multiplication of its own cells, chi efly of the parenchyma. The stroma, which either lastsover from the other tissue, or is newly formed, increases at a slower rate, and its distribution is often very irregular. This is most marked in the epithelial tumors, where in one part you may find a stroma as richly cellular as granulation tissue, and in another part masses of apparent scar tissue, either very scanty or very de nse. The tumor may cuase inflammatory and hyperplastic changes in adjacent tissue and thus thelatter may appear to be converted into tumor tissue. But the tumor grows of and from it self & and normal cells do not become converted into tumor as it infiltrates but merely gives place before the the invading cells.

Th e rate of growth varies from a slow increase, which can hardly be followed, to an almost unconceivable rapidity, with all degrees between. Commonly the more adult tissue is the slower in its growth. With sufficient nourishment the tumor may reach an enormous size, especia lly fibroma, lipoma, adenoma, and ovarian cysts. The pressure of the tissue is important for the growth, for where the tissue is firm and dense the tumor grows slowly, while is it breaks into a canal o r cavity or on a surface and the pressure is relieved it may tak e on an extreme rapidity. Injury and infection will often increase the rate of growth, probably by causing hyperemia and better nourishment. At certain life periods tumor growth may be very rapid, e.g. pubity, during pregnancy and in early old age.

Metastases. The group of changes where the tumor appears are called protopathic and all subsequent others, as the tumor repeats itself are called deuteropathic or secondary.

Primary multiple tumors must be distinguished from metastatic for the lesion in some cases is multiple from the start, and the tumors need not all be of the same kind. Thus one case is reported of ovarian tumor with seven in one ovary and four in the other. In another case the uterus contained a myoma, a polyp, a carsinoma and a sarcoma. Workers in paraffin factories are liable to cancer of the sk in and these often begin as multiple tumors associated with chronic eczema; the tumors begin some times symetrical some times not. The second muptiple tumors are due to metastases either local, or regiona l, or systemic.

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Secondary multiple tumors.

These are due to metastesis either local, regional or systemic. Metastesis is most common with infiltrating tumors, and is one of the chief reasons for considering them destructive andmmalignant. Occasionally also tumors of central growth make metastesis. With the infiltrating kind it is easy to understand how cells penetrate lymph and blood channels, and it is assumed that these cells are maoeboid. Beside filling lymphatics the infiltrating cells make lymph thrombi, which are partly coagulated lymph and partly tumor cells, hence the larger lymphatic trunks appear as solid cords or varricose ridges, and even the Thoracic Dict may be plugged. Besides this continuous growth along lymphatics, the cells may be caught at scattered points, making an interrupted spread. Such points of arrest are common in the nose and there the cells multiply and replace the lymph tissue. While the lymphocytes are dying out under such invasion, the stroma of the nodes may become hyperplastic. In time the capsule of the node is broken thro and other tissues near by are invaded. The direction of the lymph flow towards more centrally placed nodes carries the tumor more deeply in, reaching the veins in time, and then a rapid spread occurs. For a time fhe nodes may hold back the spread of the tumor, and this is of the utmost surgical importance, for the surgeon removes all the nodes corresponding to the tumor, hoping to prevent its return after the operation. The nearest nodes may escape and more distant ones become the seat of the metastesis. Further the regional nodes may become swollen and hard, long before the tumor invades them. This is because the main tumor is inflammed, perhaps ulcerating, and the lymphangitis spreads to the nodes.

As a general rule carsinoma spreads thru the lymphatics, and sarcoma thru the blood vessels, chiefly veins. This is due to the orggin of the sarcoma in con. tis., its large and imperfect vessels, hence the path of dessimination for the sarcoma may be thru the capillaries, either interrupted, continuous, or thru veins with malignant thrombi, or if the tumor invades their walls, thru the arteries, but these are usually resistant.

The tumor may spread for a distance along the perivascular lymph sheath and enter the vessel later. When a tumor has once entered such channels, especially those of large lumen, growht becomes very rapid and mixed with tumor cells, and blood clots. Pieces breaking from these may cause embolism of the heart and lungs but if the peices are small they may pass the wide capillaires of the lung and enter the systemic circulation, then the secondary tumor may be very distant from the primary.

Microscopically the secondary tumors resemble the ppimary, but their gross characters depend up the conditions where they develop. A retrograde metastesis may take place thru the lymphatics in a direction contrary to the lymph flow. This is limited to the immediate neighborhood of the primary tumor, the invasion following the lymph or blood channels, because that is the line of least resistance. Thus carcinoma starting in the crypts of the mucous tubules of the stomach may spread laterally along the submucosa, and then with the lymph stream to the muscular coat, & against the lymph stream to the mucous surface. Here it ulcerates, opens radicles of the Portal Vein, and thrombi from these pass to the liver and set up secondary tumors. So one tumor may show several varieties of metastesis.

Another method of spread is by implantation. This is seen in the large serous cavities whose walls and contents are in constant motion, e. g. cancer of the ovary may break thru to the surface of the ovar y, small portions may then beimplanted upon any part of the peritoneum and the whole inner surface may be dotted with these cancerous nodules, either millary or larger.

Another mode of spread is by contiguity. Thus a tumor of the breast may pass thru the chest wall to the lung, involving all the tissues simply because they are adjacent. Another mode is by continuity, as where a flat cell cancer of the labium majoris may involve the skin of the abdomen and thigh.

Extension of tumors:-
Local, regional or systemic by,
1. Metastesis (Thru blood or lymph channels).
   a. Direct.
   b. Indirect.
   c. Retrograde.
2. Contiguity.
   a. To tissues similar or not.
   b. variety-- implantation.
3. Continuity.
   a. Limited to one tissue.

Recurrence of tumors.

After operative removal the return of tumors is very common, especially in the malignant, sometimes in the benign. The return may be in the scar, or close to it when portions of the tumor were left behind and they may develope rapidly because of the increased nourishment during the congestion of healing. The new tumor may be also in a regional or distant node. A special form is called transplantation, e.g. in removing a cancerous uterus some of its cells may be deposited on the edges of the abdominal wound, during healing these may develope a new tumor. This is called an artificial metastasis. The length of time of recurrence varies with the different tumors, and different operators. It may be immediately, tumor cells developing in the granulation tissue of the wounds; it may be rapid but later, after healing is complete; or it may be after some months or years. It is considered safe to tell the patient that if there is no return after three there will be none. When the first tumor is on one organ, as the uterus, and after a time a similar growth at a distance, as in the breast; or where one breast has been removed and after a time the other shows a tumor, the second tumor may be a recurrence, or it may be wholly new. It is often impossible to tell which.

The effect of tumors on the general condition.

Several factors enter into this, five of which are important:- (1). The anitonical position of the tumor. Thus a small fibroma of the Dura may cause death by pressure, and one of the same size on the skin would be only an inconvenience.

(2) Size of the tumor. A large cyst adenoma of the breast may cause but little trouble, one of the same size in the ovary might give dangerous symptoms, from occlusion of important vessels, or compression effects; and a smaller one in the lumen of the gut might occlude it or cause invagination by gragging on the walls.

(3) Conditions of the tumor. The presence in it of degener ation and hemorrhage. Thus a subserous fibroma of the uterus might have its pedicle twisted, then soften and break down, and cause a general peritonitis.

(4) Important finctions may be altered by the presence of a tumor in a gland. If the body is deprived of the gland's normal prodduct the health suffers. Another case is the blocking of an important canal by which food is taken or waste voided; thus a benign tumor of the oesophagus may cause starvation, and tumors which narrow the pylorus or rectum have serious results.

(5) Infiltrating forms cause a peculiar tumor cachexia which includes anemia, emaciation, loss of weight and strength, sweating and diarrhoea, loose inelastic and harsk skin, and a waxy color to the face. In such conditions a lesion of the cord or kidneys may develope; the mucous membranes atrophy; the fat of the body is absorbed from under the skin, and about organs. There is increase of w.b.c. in the blood and decrease of r.b.c. and haemoglobin. The cachexia does not depend upon the diversion of the nourishment from the body to the tumor, for then the largest tumors would cause the worst cachexia, but this is not the case.

Ulceration and infection of the tumor with absorption of toxins are of more importance but the cachexia often precedes the ulcer-

ation. The essential thing in the production of the cachexia is a form of auto-intoxication. The secretion of the tumor cells having a proteolytic action on the body's proteids. This is shown by the great excess of nitrogen in the excreta. The worst forms of cachexia occur with carcinoma, a tumor developing in epithelial cells. The normal function of the epithelia is to furnish ferments, and they have a close relation to the lymph channels, hence when these cells are atypical they produce the pathological ferment which reach the general circulation with ease.

Malignancy. The question always arises whether any tumor is benign or malignant.

A neoplasm is called benign when it grows slowly, is not apt to ulcerate, makes no metastesis, does not effect the general health, nor return after operative removal. In the most part those of mature tissue and central growth behave in this way. Those of appositional growth and immature cells have the injurious characters This does not hold absolutely but it is the safest guide to consider tumors which act destructively as malignant. Many benign tumors at a time and degree of growth, which we are not able to determine, are liable to become malignant. All the new cells become atypical as they multiply and thus fibroma becomes sarcoma and adenoma turns to cancer.

Healing. Even the benign tumors show almost no tendency to heal. Inflammation does not arise spontaneously and does tend to heal. Tumors arise spontaneously and have no such tendency. Sometimes inflammatory and degenerative changes destroy a tumor. Advantage is taken of this in superficial inoperable tumors. The method being to excite a local erysipelas and when this recovers the tumor cells have died. Mechanical conditions like twisting the pedicle and cutting off the blood supply may have the same effect. The only safe treatment is operative removal, sooner the better, even those that are benign.

5-29-07.

Eti ology of tumors.

First we mu st know know what determines the mytosis of the cells.

(1) Heredity. In many families this is very clear. Sometimes confined to males,,sometimes to females in direct descent, and in all tumors those of the breast and uterus seem to be most inherited. It has been claimed that a tumor embolus may lodge in the placenta and make its way into the fetus. This is improb able for the tumor would develop soon after birth instead of in late life. The only thing inherited is a constitutional disposition toward tumor formation, and this we are not able t o explain.

II.-- Constitutional weakness, and the so-called spermatic theory. That a normal tissue may have its cells converted into to a tumor by a kind of metaplasia; these are wholly unsatisfactory and on ly need mention.

III. Virchow's theory of irritative injury explains some tumors. This is seldom a single injury, but is frequently a repeated stimulus, either chemical or mecha nical.

A. Chemical irritation.in some trades. Thus those who work in dust, like metal grinders may have cancer of the lung; chimney sweeps have flat cell cancer of the scrotum.

B. Mechanical irritation often repeated; e.g., in the digestive tract cancer is most common where the lumen is narrow as behind the bifucation of the trachea, pylorus, coecum, and flexure of the colon. Another instance is epithelioma of the lip. It is most common in pipe smokers and on the lower lip, probably caused by the pressure and heat. Cancer of the gall bladder is common with gall stones in the cavities.

C. Inflammation and scars, are often the starting place of tumors; thus cancer of the cervix uteri appears to be re-

lated to injury during child birth. Flat cell cancer may start in the edge of chronic ulcer of the leg.

D. Tumors following efforst at repair, like sarcoma after fracture of bones.

Large single injuries most often call attention of the patient to a tumor already started and are only a co-instance, e.g., cancer of the breast neglected until injury calls attention of the patient to it. - A clear history of tumors is obtained in about 14% of all cases. That means that in more than 80% of all cases it is not even suspected. Also certain parts especially liable to injury as the hand and foot, are not particularly liable to tumors.

IV. Cohnheim's fetal remanants theory. This assumes that a fetal tissue may have more cells produced for it than it really needs. The extra ones may be separated from the main tissue and lie dormant as a mass of embryonic cells until some stimulus starts them to growing. Then being embryonic they have an enormous power multiplication. If their product resembles mature tissue they make a benign tumor, but if the cells remain embryonic they make a malignant tumor, which no older tissue can withstand. Such remanants snared off late in fetal life tend to make tumors of but one kind of tissue. Those separated early make tumors of several kinds of tissue. Several facts support this theory:-

(1) That tumors are often born with the patient; others develop in the first years of life.

(2) Those which appear at later life periods may resemble embryonic tissue and the similarity to cells which never appear except in the fetus. may be very strong. Such a case is the myxoma, which resembles the Whar ton's Jelly of the umbilical cord.

(3) Tumors are common at points where the arrangement of the fe tal tissue is complicated. Where epithelia changes its character and where parts of the ectoderm fold in to meet the endoderm. Consequently at the openings of mucous canals like the mouth, nostrils, rectum and anus and cervix there forms of cancer are common.

(4) Dermoid cysts. are most common at the metting points of sever al fetal tissues. As in the parotid where they start from bits of the outer end of the second branchial cleft. This evidence is strengthened by tumors from scattered bits of theadrenal, pancreas, thyroid, and mammary gland.

(5) Structures of fetal lifel which ought to atrophy but do not, often present cystic and other tumors.

(6) Tumors are often developed from or connected with congenital annomalies.

(7) Tumors are often symetri cal, occuring in both kidneys, both ovaries, both breasts, etc.

Among the chief objections to Cohnheim's theory are:- that such islands of misplaced cells are not often found. Also where we do find them, as cartilage cells in the long bones, or flat epithelia in the tonsils they seldom show transitions to tumors. Also ne oplasms may arise in scar tissue, which cannot possibly contain any fetal remanants. Also in some places where fetal relations are complicated, as in the brain, heart, and kidney tumors are not especially frequent. Further chemi cal irritants are often clearly the cause. Lastly tumors arise more often near the lines of the fusion of complicated tissues rather than just at the m, and these places are especially liable to mechanical and other irritants.

V. Parasitic or infectious theory. This is a very old one which has come into fashion again in late years. It concerns especi ally the mali gnant forms, cancer and sarcoma, and is based upon a seeming resemblance between the clinical course of some malignant tumors and certain diseases known to be parasitic. Based also upon certain microscopic findings, which are claimed as parasitic. An attempt has also ben made to prove local and general infection of places, so that some writers describe "cancer-houses" and "cancer-regions" and epidemics. They claim that cancer is especially common in low sheltered vallies whose rivers overflow their

banks and the lowest mortality is found on high ground, especially of limestone formation.

Objections:-(1.) No tow observers agree as to the nature of the parasite.

(2) No parasite has been cultivated which is worthy of mention. or belief.

3. The cell inclusions descri bed as parasitic are due to errors in hardening and staining, or they are epithelia or endothelia which have p icked up other cells or they are masses of chromatin and alter ed cell products. (4) Further such material injected into other animals makes inflammatory changes, never a tumor. (5) Further the analogy drawn from infectious granulomas is a false one, for in them the living cause is a metastasis causing the local cells to multiply, while in a tumor metastasis the living cells are both the cause and the lesion. (6) Further tumors do not develop in any of the diseases which are known to be parasitic. (7) Tumors do not occur in epidemics as the parasitic diseases do.

Cases of accidental or experimental transplantation have been considered proof of the parasiti c nature of tumors. They are merely successful artificial metastasis of tumors and are very seldom successful. No surgeon in the whole history of medicine has ever inoculated himself with a tumor while operating, though his hands may have be en wounded and bathed in the juices of the tissues.

VI. Hansemann's anaplasia theory. Assumes that the normal characters of any tissue depend upon normal mytosis in the cells that compose it. When mytosis begins abnormally the tendency is for the resulting cells to be unequal in size. The larger ones resemble less specialized cells and tend to become atypical. With some stimuli such cells may form a tumor.

VII. Ribbert's theory of tissue tension. assumes that in every gr oup of cells there is a normal there is normal tissue tension and betwe en different tissues there is an opposition and that if a group of cells is releived from this control they may take on a rapid independent growth.

VIII. Adami's theory or habit of growth work. teaches that there are two activities in every cell, each of which may be carried on but not both at once. These are multiplication and special function or as he calls them "habit of growth" and "habit of wor k". The vegetative qualities make the cells grow. When fully grown it pe rforms its special duty. Each of these demand sufficient nourishment. If an adult cell is unable to functionate the excess of nourishment will be devoted to multiplication. The cells then loose their habit of wor k and take up again the habi t of growth. If this exceeds the normal bounds a tumorwill result.

IX. Rindfleisch's nervous control theory assumes that variations in the nervous control of the tissue will permit the cells to multiply in anabnormal way.

4-7-07.

There are three main families of tumors according as themost important element in them is con. tis. , epithelial tissue, or combinations of both. So we have:-

(1) Con. tissue tumors.
  (a) of the type of nature tissue.
  (b) " " " " immature tissue.
(2) Epithelial tumors.
  (a) of the type of nature tissue.
  (b) " " " " immature tissue.
(3) Mixed tumors.
  (a) Arising from one embryonic layer.
  (b) " " two " Layers.
  (c) " " three " " .

Connective tissue tumors of nature type- Fibroma. This consists of con. tis., fibers, and cells with vessels. The parenchyma is composed of nature con. tis. and the stroma is made up of vessels, and their supporting tissue. There hence but little difference betreen the strora and parenchyma. But fibromas may present degenerations

or transitions to other tumors, which make this distinction between parenchyma and strona very clear. There are two main types of true fibroma:-

(a) Fibroma Dura, or hard fibroma. In it the tissue resembles fasciae or ligament, made up of thick bands of con. tis. with few cells of spindle shape.

(b) Fibroma molle, or soft fibroma, which has its type in areolar tissue and consists of delicate fibers in a net work, with many cells both fixed and wandering. This is usually better supplied with vessels than the other.

There are many subvarieties owing to some gross or microscopic variation:- Fibroma Telangiectaticum = one filled with large dilated capillaries; Fibroma Cavernosum = one filled up with dilated veins; Fibroma myxomatodes = one filled up with mucoid tissue.

Hard fibroma: this is usually firm and tough so that it creaks on cutting. The section is white and glistening, very dense, not vascular, and shows closely interwoven bands, at times with a wavy outline. If the arrangement is like a net work it is called plexiform fibroma. In these the fibrous tissue is often arranged about nerves and gland tubules; in the ordinary fibroma it is arranged about the small vessels Hard fibroma occurs wherever fibrolated con. tis. is found; most often in subcutaneous; submucous; and subserous tissue. Also between muscles and tendons, in fasciae, periosteum, and the sheaths of nerves. Among the organs the kidney, uterus, breast, and ovary are the most affected.

Microscopically there are bands of firm con. tis. variously interlaced, with here and there a few slender nuclei parallel with the course of the fibers. The endothelia of vessels and lymphatics may show a collateral hyperplasia. In the younger parts we find round cells, and transitional forms to fibroblasts. A tumor of this variety is some times called Desmoid.

The vessels are usually very scanty but may be widely dilated from the traction on their walls. This makes a cavernous form, which is common in the nodes, pharynx, and uterus and is important because it may give rise to severe hemorrhage.

Hard fibroma are usually sharpely circumscribed, project from the surface or lie burried in the organs and in the latter case may have a distinct capsule as if it were a foreign body.

Their growth is central. The new tissue developing between the older bundles, and pushing them aside. This explains the density, the interlacing bundels of fibers, and the effects on the blood vessels. Degenerations are common, calcification, and sometimes true osefication. From their scanty supply of vessels liquifactive changes often make cystic cavities and edema and mucoid degeneration occur.

In the fibroma of the uterus many smooth muscle cells may be found making fibro-myoma, but the subserous kind is often pure fibroma. Other combinations are frequent, as in the breast adenoma which may be cystic, pericanilicular or intra-canilicular. If especially involving the ducts of the breast, plexiform fibroma may result.

Soft Fibroma: This is usually white or grey with a reddish tinge. It may look somewhat translucent as if edematous. This form is common as round or polypoid outgrowths from surfaces.

The microscopic appearance depends upon the amount of fluid in the tissue. In some there are delicate bundels of con. tis. loosely woven together with many fusiform fibroblasts; others resemble areolar tis. and in the meshes of various sizes, there is lymph or mucin, or serum. The vascular supply is usually copious and grouped about them are many round cells. The latter may come from the proliferation on the outside of the vessel or from lymphocyte infiltration, as in an inflammation. Soft fibromas start frequently in the subcitis, between muscles and under serous and mucous surfaces.

In the skin they make the wart or verruca or if large = cutis ap pendula. They are often distributed along the main nerve trunks and are symetrical. A special form known as Fibroma Molluscum occurs as small multiple tumors starting in the sheaths of sweat and sebaceous glands.

Keloid is a variety of fibroma which starts in the corium and makes ridges on the surface, interrupted by nodules. They have been described as spontaneous and cicatricial. Practically they all start in scars. In a person who is disposed a pin scratch or a mosquito bite may start the lesion. They are usually reddish, linea, fleshy and almost always come back after operation. This is because of their relation to the vessels. The negro race is especially liebel to them. They begin by proliferating fibroblasts, along the sheaths of nerves, and both appear of the surface and follow the vessels deep into the tissue.

Keloid develop in scars but differ from scars by exceeding the limits of the wounds, while a scar remains in those limits and tends to decrease them by skrinkage. The fibers for the most part run parallel with the surface and papillae are usually present.

Xanthoma or yellow tumors. This commonly develops in the eyelid at the inner angle, either as a flat elevation = xanthoma planum, or projecting = xanthoma tuberosum. A so-called symptomatic xanthoma develops in other parts in diabetes and severe jaundice sometimes as a multiple tumor. These differ from the eyelid tumors in being more inflamm atory and having fewer xanthoma bodies and not so much con. tis.

The xanthoma bodies are large epithelial cells often with several nuclei; the cytoplasm crowded with what looks like fat drops but these do not give the micro-chemic reactions for fat.

Closely related to the fibroma is the large fibrous hyperplasia of the skin known as elephantiasis. This is an acquired disease of the tropics, and affects the thighs, legs, scrotum, labia and is usually due to filaria embryos in the lymphatics. The size of the parts may be enormous, cases are recorded where the scrotum weighed as much as 50 kilos. The disease is carried from patient to patient by a female mosquito.

Myxoma is made of mucoid tissue and a small proportion of con. tis. with vessels. It has no normal type in the adult body but in the embryo is the first stage of both fatty and fibrous tissue and at birth is found in the umbilical cord as Wharton's Jelly. Such tissue develops in many pathological processes from both con. tis. and fat & severe edema in these tissues closely resembles it. Similar changes occur secondarily in many other tumors like fibroma, lipoma, and chondroma. In a true myxoma the tissue is mucous from the first, its development is independent and free from control, as is not seen in fetal mucoid tissue. It consists of more or lessof gelatinous tis. in which lie many stellate and triangular cells with long processes at their angles, making a delicate stroma. Wandering leuco's and mast cell are also common. On adding acetic acid the mucin ppt. as fine lines or as a net work. The tumor is usually well provided with vessels which are large and have but few capillaries. Along these vessels are areas of proliferating cells which are the seat of the growth.

In form amyxoma is usually shperical, lobular, polypoid, or fungus, they are often very soft feeling like a loose sack full of fluid. They are translucent, grey or reddish, and on section show fine fibrous threads lying in the jelly. From the cut surface a sticky fluid can be scraped, which will draw out into threads.

True myxoma are not common. They are found most on the skin of the back, thighs, scrotum, and labia, and face and less often in con. tis. of bone, nerve, mucous membranes. In the breast they are commonly associated with adenoma. Myxoma are often congenital and are seldom pure.. The most important clinical kind is a combination with sarcoma. The myxo-sarcoma, is a vascular, richly cellular, starts usually about vessels and often gives rise to severe hemorhages. True or primary myxoma begins in the embryonic tissue which forms fatty or areolar tissue. There are three important kinds of these:-

(1) Myxoma of mucous membranes. Especially in the nose, larynx, & uterus often following chronic inflammation of the part, and often containing glandular elements.

(2) Myxoma of nerves. They start from endo- and peri-neurium and are usually multiple.

(3) Myxoma starting in the chorionic villae of the placenta: they

occur as bunches hanging from a mian stalk, like a bunch of grapes and areocal ledavesicular mole. They follow abortions and also birth at full term. The fetus may be small and dead or fully developed.

Microscopically theyshow a core of edematous Con. Tis. covered with a syncytium of proliferating cells and in some cases invade the wall of the uterus and become malignant. In general myxoma grow slowly and do not make metastases.

4-5-07.

Lipoma:-

These are composed of fatty tissue usually circumscribed, round and encapsuled, sometimes polypoid. It may lie beneath the fascia, atrophy this then lie beneath the skin so that on pressure it may becaused to disappear, protruding when releived. They are soft and elastic, and may reach an immense size, and never make metatases. Their independence is shown by the way they persist, even when the general fat is lost in extreme emaciation. Fat tissue in lipoma differs from the normal in two ways:- in the gross its lobules are larger; and microscopically its cells are larger than the normal cells. At pubity, during pregnancy, and after menapause lipoma may show sudden increased rapidity of growth.

A congenital origin for lipoma is sometimes quite clear, as also heredity.

The vessels are seldom well developed, the amount of stroma may be very large; then the tumor resembles fibroma dura, and if the str oma becomes mucoid = lipoma myxomatodes. At times the lipoma drags out its pedicle and then it becomes lipoma pendulum. These tumors are seldom inflammatory and atrophy. The commonest degenerations are cystic, calcerious, and mucoid.

Lipoma are found wherever fat and fibrous tissue occur, developin g sometimes from one sometimes from the other. They are most common on the external surfaces, about the abdomen, buttox, thighs, back and neck. They are very rare in the liver, lung, and heart. Occasionally they have been found in the new born child. Other forms occur about the neck in men of middle age; the fat tissue fil ling up the space between the chest and lower jaw, sometimes extending to the arms and body.

Chrondroma:

The true tumors of this variety are composed of cartilage. From these we must separate the hyperplastic outgrowths of cartilage called ecchondrosis which are fairly common about the joints during pubity.

Chondroma is usually protuberant, hard and somewath elastic, smooth and opalescent on section. They do not infiltrate tissue, but may grow along nerves and lymphatic channels. There are no vessels in the tumor proper until degenerations occur. But the nutrition of the tumor is abosrbed from the vessels in the fibrous capsule and bands between the lobules of the tumor.

Microscopically we find all forms of caritlage, but the hyaline is the most common. Cartilage cells are round, oval or spindle shaped, som etimes stellate and they may lie in distinct capsules, either singly or in groups. Where growth is rapdi the cells may lie inlong columns, hence the resemblance to cartilage is less distinct. Mixed forms are common; combined with fibroma, lipoma, myxomaand osteoma. Combinations with sarcoma alsooccur. Other mixed chondroma containing but little epithelium and con. tis. are found in the testis.

Chondroma may occur in any age, and is sometimes congenital. Most common in children sometimes developing about pubity as a multipl e tumor. Degenerations are common; simple softening of the tumor, or the cartilage may split into fibers, mucoid and cystic changes may occur. Chondroma is usually a benign tumor, but it may make metastases. Starting in the pelvis such tumors may grow into the veins and small thrombi prodice a tumor elsewhere. The same is true wi th tumors in the lung. In some cases the transport is thru the lymphatics; this is most common in chondroma which are softening and with the malignant variety, like chrondro-sarcoma.

There are three main varieties of chondroma:- (1) True chrondroma which develop either from periosteum, or endosteum or bits of cartilage not included in the process of oseficaction. (2) Ecchondroma arising from various parts of the skeleton, often multiple in the hands and feet. (3) Enchondroma- developing in soft parts almost

always hyaline sometimes fibrous cartilage. In the breast this arises from scattered bits of the costal cartilage; in the lungs from the caftilage of the trachea and bronchi; in the parotid from bits of cartilage snared off from the branchial clefts; very rarely in the submaxilary from the same origin. In the testis and ovary the origin may be from misplaced bits of the misplaced vertebrae, but these tumors are sometimes true mixed tumors, derived from a second fetus and hence sometimes called fetus infetu.

Osteoma:

A tumor wholly made up of bony tissue is called a osteoma. If there is a secondary bone formation in the tissue of another tumor this is not considered an osteoma. Further newly formed bone of inflammatory origin is also excluded. This includes the osteophyte, hyperostosis, the exostosis, and and all exercised bones developing in tendons most used. Ture bony tumors are usually circumscribed, of steady growth but benign.

The true ostomas are named according to their position as:- central, peripheral or cortical; according to their structure they are called, osteoma medullary (including marrow) with subkinds, osteoma spongiosum and medulosum; and eburnum or durum if very much harder. The bone in a tumor develops like the physiological, but the Haversian canals and the lamellae are often somewhat irregular. The marrow may be red, fatty or mucoid. The ivory like tumors (Durum) resemble compact bone and the others have wide narrow spaces and vessels. The surface of the tumor may have large openings for the nutrient vessels.

These tumors are almost all confined to the first years of life. At times the tumor begins inside of a long bone. It grows until it breaks into the soft parts and then atrophies them on pressure. The tumor is always benign, but by position may be a serious inconvenience e.g., near a joint.

The commonest combinations are with the fibroma, chondroma, and the malignant form is osteo-fibro-sarcoma. A special form developing from the teeth is called a dental osteoma, or when chiefly made up of dentin = odontoma.

Angioma:

A tumor may be composed of either blood vessels or lymphatics, hence we have the two main types of haemangioma and lymphangioma. According to the vessels represented gives three forms:- if capillaries chiefly present = vascular veuvus; if arteries = circoid aneurism or plexiform angioma; if veins = angioma cavernosum.

We exclude from the angioma all cases of other tumors which happen to be very vascular, for these we use the tumor name and the adjetive telangiectatic or cavernosus. The great vascularity may be due to their origin in a very vascular tissue or a disturbed circulation in the tumor will enlarge its vessels, as when a polypoid by dragging on its pedicle compresses the veins. In other cases removal of tissue tension when the tumor is degenerating allows the vessels to enlarge. The proportion of stroma present is important for the more richly cellular the tumor is the more vascular it is. The relation of the stroma to the vessels, as exerting traction upon them may permit dilitation and resemblance to angioma. Lastly we exclude all dilitation of vessels previously normal using the word varix or variocele aneurism is veins; aneurism if arteries.

Henangioma Simplex. It is most common about the head and neck. It is situated in the cutisand either flat or slightly elevated. The skin over it may thin and delicate or unchanged. They seem to have a relation to certain fetal fissues, as the distribution of nerves, hence we find them along the trigeminus on the face, lip c heek, and neck, but they may occur in deeper tissues as the brain, liver, and heart. Some are congenital, some appear soon after birth, others develop in advanced age.

There are three factors entering into their formation:- An increase in the local blood pressure, causing the development of new capillaries and an increase in rate of flow, causing a dilitation.

Microscopically the walls are thicker than normal capillaries; their lining endothelia may be numerous, and disposed in more than one layer. By injection they are shown to have but few relations with adjacent normal vessels. Their arrangement may be somewhat lobular, as if the capillaries about the sweat, sebaceousglands, and hair follicles were their starting points of dilitation.

One importance of these capillary hemagiomas is there transformation into endothelioma, which may go malignant.

4-10-07.

Cavernous Angioma: These are found most in the skin & subcutaneous fatm they may be quite large in size; e.g. occupy half of the face. Those in the scalp may communicate with the large sinuses of the dura. These cavernous angioma contain wide vessels held together by a small fibrous stroma and resemble dilated veins, but in origin they are capillaries which have distended by traction, and whose walls have thickened during the process. Such angioma are common in some of the internal organs, as liver, spleen and kidney; in others it is unusual as in the gut, bladder, and uterus. Inthe liver these tumors are single or multiple, of a dark blue color, sometimes of a brighter red and lie just under the capsule. They do not act much like tumors but simply take the place of some liver tissue without pushing the rest aside. In the stroma scattered liver cells and pigment may be found. They can be injected from the Hepatic artert or Portal vein, but not from the Hepatic Vein. They are more common in the aged patients than in early life. These angioma are benign unless combined with sarcoma and endothelioma and they may serve as the starting points for either of these tumors. Apart from the malignant combinations the damage they do is either local, like eroded bone, or it comes from rupture or hemorrhage of the blood vessels.

Arterial angioma or Cirsoid Aneurism appear to be dilitations of previously good arteries rather than a new growth, but clinically they erode bone and act like tumors and should be included with the others. Their origin may be congenital or follow some injury. They are most common about the head and face and on palpation feel like a mass of worms in a loose tangle under the skin. Compression of the artery leading to them stops their pulsations and makes them collapse. At times they drag out a pedicel and may be pendulus; in other cases they become inflammed and ulcerate.

In most any angioma from blood vessels, pulsations may be either seen or felt. This is most marked where arteries dilate in a group.

Lymphangioma:

Is a tumor composed of dilated lymphatics either already present or newly formed. We have three kinds: (1) Lymphangioma simplex; (2) Lymphangioma Cavernosum; (3) Lymphangioma Cysticum. (1) Lymphangioma Simplex.may be a circumscribed tumor under the skin, or a diffuse form with chronic inflammation, or combined as part of another tumor.

In the gross there is a white or yellowish area of skin, flat on the surface or elevated a little, and some of the enlarged lymphatics may rupture and discharge lymph. This form makes the congenital enlargement of the lip = macro-cheilia; or of the tongue = Macro-glossia. They may become inflammed and this sometimes cures them, sometimes makes them much worse.

On section the structure is porous, showing a great number of small canals lined with endothelia and filled with a clear fluid. If If the tumor blood vessels are dilated as well, the color of the growth is red.

Microscopically the connecting lumena are seen dilated in places with but little tendency for the endothelia to multiply.

(2) The lymphangioma Cavernosum: This occurs in the skin, between muscles as in the tongue, in the mesentary, and also as congenital elephantiasis. The spaces are relatively very large and contain clear or milky fluid, often with lymphocytes in it; sometimes with traces of hemorrhage. The fluid coagulates easily, contains albumin, globulin, and fibrin.

(3) Lymphangioma Cysticum: is most frequent about the neck usually beneath the Sterno Mastoid, near the symphesis of the chin, or in the supra clavicular fossae. (Surgeons have a special name for this = Hygroma cysticum). They tend tp enlarge especially down behind the sternum and out toward the shoulder. They are commonly found on but

one side but they may be bi-lateral. Usually they begin to develop soon after birth and grow slowly until they reach a large size.

In the gross the tumor consists of numerous large vesicles so that it looks spongy and thro the walls the fluid contents can be seen. On the inside the walls are smooth and lined with endothelium, sometimes thrown into ridges and papillae. These tumors seem to be due to newly formed lymphatics, steadily distending from continuous secretion from their walls. They must be distinguished from Hydrocele Coli of the neck by the following: The hydrocele has a single cavity, its wall is fibrous butmay contain cartilage and lymphoid tissue; it is lined by epithelium which may be cilliated & and the situation is more superficial. The hydrocele/ arise from imperfect closure of a branchial cleft. They are usually lined by mucous membrane but may be lined byepidermis, in whole or in part.

Lymphangioma of all forms are usually benign but their lining of endothelia may proliferate and fill them solidly, passing over into endothelioma or they may rarely combine with sarcoma.

MYOMA:

Here the cheif element is more or less typical muscle tissue as the parenchyma, with a stroma of fibrous tissue and vessels which is usually scanty. If the muscle is smooth = Lyo-myoma; (2) If the muscle is striped = Rhabdo myoma;

(1) Lyo-Myoma Tumors of this class are usually small, spherical masses sharpely circumscribed and often with a capsule of a fibrous tissue from which they easily shell out. They are seldom entirely composed of muscle tissue alone but are apt to have more or less of fibrous tissue also. The true myoma are found in the stomach, intestines, nipple, testicle , and sometimes in the uterus. The muscle fibers may show a clear relation to the vessels, either arranged along them, or in concentric rings about them.

Microscopically it is easy to confuse muscle tibers and fibrous tissue. The smooth muscle fibers have long nuclei with a double contur and rounded ends and do not stain so densely as fibroblast's nuclei nor show angular and wavy edges, because not so tightly compressed and they are also arranged in bundles parallel with each other. On cross-section the muscle fibers show polygonal figures in some of which nuclei are seen, in others they are absent. Each nucleus is oval, square,or triangular in outline and equidistant from the edges of the cell. Fibroblast nuclei,unless very young, are denser, often wavy from close packing and on section are not surrounded by a field of cytoplasm. Lastly the fibroblasts have one or more processes either single or branching at each pole of the cell.

These myoma are benign and of slow growth but may reach a large sizeand may be multiple. At times they are transformed into sarcoma.

In color they are reddish or grey. If soft = Myoma mobile; if hard = Myoma dura. As a rule they arenot very vascular.

The commonest degenerations are: mucoid, fattyy calcification, and liquifaction necrosis. From the latter there may large cystic cavities in them.

Myoma is especially frequent in the pelvic visera of women,in the tubes, round ligaments, and most often in the uterus. There are two facts common to them all, whether they are submucous, subserous, or intranural:- (1) most common in mullipara and (2) and that that they are apt to set up metritis, and hemorrhage.

Either the submucous or the subserous may hang from a pedicle. Under the peritoneum the pedicle may be twisted, cutting off the nutrition of the tumor and causing it to soften. It may then rupture and cause fatal peritonitis. This is a good example of how a benign tumor may have malignant effects. When the submucous variety rupture the pedicle they may be spontaneously expelled by a kind of false labor.

The myoma may arise from the muscle of the uterus itself or from muscle fibers in the walls of its vessels. Those developing on the posterior surface near the entrance of the tubes may contain glandular tubules derived from the wolfian body or epithelium from

Gartner's ducts. From suche combination Adenoma-myoma and Myo-carcinoma may develop. In the alimentary canal myoma is common in the intestine, either sub-mucous, subserous, or interstitial, taking origin from the smooth muscle of the vessels. They are found also in the skin as of the buttox, legs, and in the urniary passages in the prostate. The enlargement of the gland in old age may resemble myoma.in structure.

4-12-06.

Rhabdo-Myoma:-

These are tumors consisting of stiped muscle cells. Most of these contain immature muscle tissue and belong either to the spindle cell sarcoma or to the mixed tumors. The fibers may be arranged in definite bundles or more often with no definite arrangement. The tumor may be congenital or develope in the first years of life.

Microscopically we see some fully developed fibers, but mostly abnormal varieties, such as spindle cells with striae partly transverse, partly longitudinal, others with striae radiating or concentric, still others more imperfectly formed. Among them are giant cells with many nuclei and of itregular outline. The nuclei may be found at the ends of the spindles or on their surface or in the middle.

The true myomas grow centrally but the striped form may infiltrate as well and as they approach sarcoma in type the infiltrating growth becomes very important. Besides the usual degenerations there may be glycogenic.

The commonest sites for Rhabdo Myoma are the kidney, uterus and the vagina, less frequently the heart, tongue, prostate, etc.

Neuroma:

The true neuroma is one which consists of nerve tissue and these may occur in both the central and peripheral portions of the nervous system. There are many false neuroma developing from the endo- and peri-neurium, which are really fibroma. They are often multiple, distributed along the course of some large nerve; often arranged in tangled groups and the nerves are increased in length and become tortorous. The nerve fibers in these suffer passively from the fibrosis, but if there are new nerve fibers developing they are then true neuroma. They may be congenital; heredity may be clear and some forms are also found with elephantiasis. After amputation the nerve ends in the stump may enlarge and cause severe pain. This is called traumatic neuroma, but it is really excessive repair.

The true neuromas are classed according to their contents as:-
(1) Neuroma Myelinicum = containing medulated fibers.
(2) " Amylinicum = " Nonmedulated Fibers.
(3) " Ganglionare= " Ganglion cells.
The latter form is so rare that its existence has been denied. But they do form in the peripheral nerves connected with the ganglia of the sympathetic system.

Glioma:

These start from the strona of the central nervous organs. In the gross it is seldom sharpely defined but fades gradually as an infiltrating growth into the normal tissue. Hemorrhages, edema, and fatty degeneration are all common in such tumors. A special form grows along the central canal of the spinal cord, either as a solid band, or softening and making an irregular tube = Syringo-myelia. This may occupy the major portion of the cord or be limited to a single section, like the surface.

Endothelioma:- The word endothelioma is used for the flat cells which cover serous membranes, meningeal lymph spaces, the inner and outer side of blood and lymph channels and the con. tis. spaces. Physiologically these cells have the power of permitting the passage thro them of some fluids and some dissolved solids and this is a true secretive function, not a passive filtration . They have also a function of absorbing, which is of the greatest importance physiologically and pathologically. Embryologically they arise from the mesoderm and

hence the name mesothelium has been composed for them. In all the pathological processes which affect them the endothelium shows closer relations to the con. tis. than to any other, and this fact with their double function justifies their separation from the peithelium, which some late authors are trying to set aside. In some inflammations they make granulation tissue cells, some of which are epitheloid, they also make giant cells and occasionally con. tis. develops from them as it never does from epithelium. In endotheliomas we find all these forms of cells and also transitional forms to con. tis. ; of spindle shape with processes and making an intercellular substance. The endothelium derivatios may be cuboid, cylindrical, sometimes grouped in gland like alveoli, but they are never cilliated.

According to the c lls from which they develop we have :-

(1) Hemendothelioma = from the blood passages (peritheliomaX.
(2) Lymphendothelioma = from the lymph spaces
(3) From serous surfaces.

The hemendothelioma arise within the blood vessels; and the peri-endothelioma arise on the outside.

These tumors may be of any shape or size. A projecting mass or a general infiltration, very vascular, or almost without vessels, richly cellular or very fibrous, with various degenerations. Clinically they are not considered very malignant. They make few metatasies, seldom early, but may show a tendency to recurr. They do not often a ulcerate or involve the regional nodes, but occasionally they are rapidly malignant, as a round cell sarcoma.

(1) Lymphendothelioma:- The most definite type is found in the skin, either as a flat infiltration or a localized tumor. It is made up of finrous tissue inclosing spaces lined with different kinds of cells. Where these channels meet there are often dilitations like lymph sinuses and the whole arrangement resembles a group of lymphatics. The lining cells are flat, often polymorphous, sometimes in single layers; sometimes numerous enough to pack the spaces full. In the latter case, on cross-section, the column of endothelia tends to have a circular outline and is either solid or has a lumen. This lumen may be the original lumen of the lymphatic or may result from degenerations in the middle cells of the column. With these tumors the resemblance to adenomas is close, but there is no membrana propria; the lining cells are intermately connected with the strona, on which they rest, and there are none of the characteristic markings of the epithelial cells. The dixx distinction from carcinoma is more important. Usually some of the four following distinctions can be made out:-

(1) In alveolar adenomas we find transitions between a simple network of fibrous tissue, with spaces filled with endothelial cells and large alveoli. In the finest spaces the cells lie in linear series, the endothelial cells fill all the lymph spaces so that the stroma and vessels appear to be surrounded by them. On the edge of the tumor there transitions to flat normal endothelial cells.

(2) There is a close relation between the cells and the stroma. The endothelia are molded upon and fasten tightly to the fibrous tissue so that they cannot be separated by vigorous shaking. Many of the cells have delicate processes which loose themselves among the con.tis. fibers.

(-) In carcinoma the cells lie in the lymph spaces so losely that they may be easily removed by a brush or by shaking the section in water. They have no intercellular substance between them. On the edge of the space we find endothelia still persisting, a little increased in number, or partly atrophied. Not all the lymph spaces of the part are equally invaded by this spreading carcinoma. The hardening fluids shrink the epithelia, so that there may be a space between them and the wall. The columns of cancer cells almost never include vessels, but in the endothelioma vessels may sprout from the walls and run among the cells.

(4) The stroma of endotheliomas is often different from that occurs in epithelial structures and the mytotic figures of endothelial cells differ from those of the epithelial cells.

Six Kinds of these tumors:-
(1) Fibro-endotheliomas=combined with fibroma.
(2) Fasicula- endotheliomas , in which there are alternating layers of fibrous tissue and long narrow lymph spaces.
(3). The plexiform endotheliomas, commonest in the pia-mater.
(4) A vascular fungus kind, which may perforate the bones of the skull and appear under or on the scalp = fungus dura matris.
(5). Endotheliomas of serous surfaces, as on the pleura, starting either in its lymph spaces or it envesting endothelium.
(6) The mixed form, commonest in the salivary glands.

The lymphendothelimmas may arise in any kind of tissue but in order of frequency they are common in the skin, meningese, serous membranes, bones, and glands.

4-17-07.

Hemendotheliomas:-

Endotheliumas connected with blood vessels may proliferate in two places. If this occurs inside the vessel the resulting tumor is endothelioma simplex, or intravascular-endothelioma. When the cells on the external surface of the vessel profiferate the tumor is called a periendothelioma. Both os these were once called angio-sarcoma. In the intravascular form the tumor presents vessels nearly or quite filled with atypical endothelium and such occulded vessels may make long branching columns. The strona may be scanty and the tumor appears to be made up chiefly of vessels much interwoven. The tumor starts with the formation of many new capillaries. Their endothelium may be unusually large flat cells, or low cuboidal, or even cylindrical. You then have on cross-section what looks like a gland lumen in which there are red cells. The endothelia multiplies until they fill the vessels and become polyhedral from mutual pressure. Strona may be scanty and special dilitations of vessels may give a spongy section. Tumors of this kinds starting in bones and kidney often contain both fat and glycogen. When these are dissolved out large vacuoles are left.

In the periendotheliamas the lumen of the vessels remains open but a wide sheath of endothelium surrounds it externally. These may come from the lymph sheath surrounding the vessel. When this tumor presents hyaline degeneration of the investing cells it is called cylindroma . If the tissue contains grains of sand = Psammoma; sometimes found in the dura, choroid plexus, etc.

Connective tissue tumors of the immature type.

Definition-, A tumor developing from con. tis. with a strona which is disproportionately scanty, a cell formation which is excessive and tends to progress, the cells and the arrangenent being atypical = a sarcoma. The name sarcoma is Greek for flesh and was used because of the fleshy look of some sracomas in the gross.

Microscopically many of these tumors strongly resemble embryonic con. tis. such as is never seen in the adult, except in granulation tissue and proud flesh. The strona may be the remains of the normal tissue, or be newly formed, but in rapidly groving infiltrating sarcomas the previous fibrous strona may be hard to find. There may be only irregular fibrillae, singly and in groups, made by the tumor cells themselves. This ability to make a kind of strona is proof of their relation to con. fis., e.g., in some cases they retain a true normal function; in others they are too busy to stop for it. The strona cannot keep pace with the growth of the cells and hence in many you have a rich supply of new capillaries upon which the cells directly rest. In carcinoma it is usual to have the cells applied directly to the vessels and there is commonly a good strona with well formed vessels resembling the normal if not too numerous.

In the alveoli of carsinoma the cells lie loosely packed with no intercellular substance, while between the cells of the sarcoma we find fibrillae and slender processes, or a granular intercellular substance. The vessels in sarcona are usually numerous and most of them are newly formed capillaries in all stages of dilitation. They do not have true walls, except in the primary tumors, where some original vessels may persist. In secondary tumors there are simply channels

without endothelia. In many sarcomas the cells appear definitely grouped about the vessels, especially in the youngest parts where the mytotic fugures are most numerous. Lymphatic vessels have never been demonstrated in sarcomas but we find irregular spaces and in these there may be lymph thrombi. Since the blood vessels are so abnormal, we may expect abnormal lymphatics also.

When fresh sarcoma tissue is properly hardened and stained the number of mytoses seen is astonishing. This is an expression of its unlimited energy of growth. Few of the mytoses are normal, most of them are multiple or confused.

Sarcoma starts most often in cutaneous, subcutaneous tissues, serous, and subserous tissues, between muscles, and in great organs; fasciae, lymph tissues, neuroglia and muscles. The earliest stages are unknown. Many of these tumors are congenital, other occuring during the first years of life.

The density of sarcoma varies between semifluid in the medullary of soft forms, and the hardness of fibro-sarcoma with all degress between. When the tissue of origin has the power of forming cartilage, bone, pigment, and etc, the sarcoma may retain some trace of this function. Usually the tumor is solitary to begin with, but in the lymph nodes and the skin it may be multiple from the first.

Those of a central growth usually have a capsule, more commonly they infiltrate and are not shapely defined. Hemorrhage from the thin walled vessels is very common, as also mucoid, fatty, necrotic, and other degnerations. In most cases the sarcoma grows rapidly, is locally destructive, makes early and wide metastases, and returns quickly after operative removal. Metastases usually occurs thro the blood vessels. Because of its wide and imperfect vessels it easily breaks into the veins and may then show a rapid dissemination to all the important organs and this condition is called sarcomatosis. Metastases thro the lymph nodes may occur with the small round cells forms and some melanotic and spindle cell tumors involve the regional nodes.

The effect on the constitution varies; it is worst when the tumor starts in a blood making organ, like the spleen or the marrow of long bones. The cachexia is usually not so profound as with equally severe carcinoma.

Vatieties:-

It is always customary to divide sarcomas according to the prevailing type of cell which they contain although as a fact we find more then one kind of cell in almost every sarcoma. Another division includes those whose cells are immature and those which sow relations to higher tissue, and hence we have :-

A. Sarcoma with immature cells.
   (1) Small round cell.
   (2) Large round cell.
   (3) Small spindle cell.
   (4) Large spindle cell.
   (5) Flat and stellate cell.
   (6) Giant cell.

BA Sarcoma with more mature cells.

A-1. Round cell sarcoma or Globocellulare. Tumors of this kind are soft, white, or red, resemble marrow is color and softness hence called encephaloid; either prominent or infiltrating growths; very vascular, and hemorrhages into them is very common. Among them we find the most rapid growing and most destructive tumors known. They are very apt to break into veins and become generalized but some spread throthe lymphatic system as well. Certain of these tumors contain small round cells and others have large round cells, the former are the more malignant. This is not because the cells are small, but rather because owing to their energy of growth the new cells can multiply while still small; hence the size of the cell is one of the measures of malignancy in sracomas. The The small round cell at times strongly resembles granulation tissue microscopically. The important distinction between granulation tissue and sarcoma are as follows:-

Granulation tissue.
2 Kinds- Fibroid and adenoid.
a. Cells present- 2. Fibroblasts- young and old.
2. Lymphocytes.
3. Plasma and perhaps pseudo-plasma.
4. Giant- especially about foreign bodies and at the site of former capillaries; cells may be concentric about these.
5. Mast cells- at edges of the focus.
6. Large hyaline mononuclears.
7. Pus cells- accidental.
b. Fibers show a definite relation to fibroblasts.
c. Vessels, numerous, chiefly capillaries, of normal structure, many occluded with healing.
d. Tendency toward con. tis. and scars, stage of granulation tissue only transitional.
e. Confined to the injury to be repaired.

Round cell sarcomas.
2 Kinds- Small round cell and large round cell.
a. Cells present, 1. Round cells - larger than lymphocytes, with a minimum of cytoplasm, hyperchromatic nuclei, with numerous irregular mytoses
4. Giant cells, if present of myeloid type.
7. Pus cells- only if the tumor of the tumor is inflamed, other kinds absent, except there may be a few atypical spindle cells.
b. Fibrillae which do not have a clear relation to the cells.
c. Vessels-numerous or scanty, but atypical. Their walls are sarcomatous, they are simple channels and often ruputre therefore if resemble normal their walls may be involved ny the tumor cells.
d. Tendency toward further invasion and destruction, cannot buildanything atypical or permanent. Immature condition persists.
e. Repeated indefinitely thro the body.

The cells of small round cell sracoma have nuclei so full of chromatin with so little cytoplasm that fresh scrapings from a tumor seem to contain only free nuclei. Between the cells there is a granular material which is partly an attempt to make intercellular substance and partly the degener ated cytoplasm. Capillary vessels are usually numerous and the cells areseated directly upon them and may occur in the lumen. When larger vessels are present there may be an attempt to surround them with strands of abnormal fibrillae.

Such tumors start from intramuscular con. tis., periosteum, and the fibrous elements of mucous and cutaneous surfaces. The worst cases are where the tumor infiltrates an entire organ without making any prominent projection from it; increase its size, and decrease its density, making rapid metastases. One form arises in lymphoid tissue both in the nodes and scattered follicles; they contain very small round cells with a delicate reticulum between = lymph-node- sarcomas, and in some sases is mistaken for coagulated blood.microscopically.

4-19-07.

Large Round Cell Sarcoma:-

These are soft or white and very liable to suffer necrosis and frequently start in the muscles. The cells have much cytoplasm and round or oval nucleus, which is faintly granular, hence they somewhat resemble epithelium. There is often more than one nucleus and in each there may be two or more nucleoli. In spite of the name round cell there are often oval or polygonal forms. Between the cells we may find either granular material, which represents an intercellular substance, or delicate fibrillae, irregularly placed, or a good stroma which has persisted. At times this good strona is arranged in alveoli, and hence there is a resembles to carsinhma. Such tumors have been called alveolar sarcoma, and also sarcoma carcinomatodes. In these alveoli the cells are closely packed, may be many sided, with no intercellular substance. Most of these tumors belong among endotheliomas but a true alveolar sarcoma may arise, most commonly from a neuvus of the skin or testis.

The growth ø round cell sarcomas is best studied from serial sections from the edges of the tumor. It is clear then that the invading column of cells destroys the tissue invaded and that the cells of the latter do not themselves become sarcomatous. In fatty and fibrous tissues the tumor cells simply fill the spaces and push other elements aside. In muscle they may enter the fibers and lie between sarcolemma and contractile substance. There is no time for reaction by the invaded tissue; it simply dies. These malignant tumors furnish several ferments, some of which are proteolytic and chemically destroy the invaded tissue. With a very slow invasion a productive inflammation may make a capsule for the tumor, but in time the sarcoma grows thro this and invades the tissue beyond.

The Spindle Cell Sarcoma:-

They are firmer in consistence and less inclined to infiltrate and therefore less malignant than the round cell. They are usually white or red on section and may be richly vascular. In the small spindle tumor the microsocopic section resembles young scar tissue. The bundles of spindles are variously women together and those transversely cut resemble round cells. The vessels seem to determine the direction of the fibers and as usual have no walls except the tumor cells.

By lateral splitting from the cytoplasm a transitional form to fibro-sarcoma may arise. These small spindle cell tumors are not very malignant and make but few metastases but are very likely to recurr.

The large spindle cell tumors are a degree more malignant. Their nuclei are remarkably large and the cells may have long processes. Besides the long spindles there are usually smaller cells of various shapes often with more than one nucleus. These cells are arranged in bundles or irregular. Tumors of this kind develop from muscle, fasciae, the stroma of organs and other con. tis.

Varieties of sarcoma are described as having flat or stellate cells. These are either endotheliomas or cases of mucoid tumors or subvarieties of one of the four types above described.

Giant cell sarcoma;- Cells with many nuclei may occur in any form of sarcoma as well as in other tumors, about foreign bodies, and in various inflammations. But in certain sarsomas, especially those arising from bone, there are so many giant cells that a special variety is described. In this form the tumor starts from the peri- or endosteum and is seldom very maligmant. The giant cells are very large, of irregular shape, with processes running into the surrounding tissue and many nuclei heaped up in the middle. One variety of this which starts from the gums is called Epulis.

All these sarcomas with immature cells are characterized by rapid irregular growth but little histological relation to the tissue of origin.

THE SARCOMAS OF MORE MATURE CELLS.

(1).Fibro-sarcoma:-

This contains both fibroma and sracoma tissue. The chief distinctions between fibroma and sarcoma are:- That the sarcoma is more richly cellular; its cells are not uniformly developed; many of them are far

larger than fibroblast nuclei in proportion to the cytoplasm; the shape is more oval than spindle; the cell processes short or lacking, and clinically sarcoma recurrs while fibroma does not.

Osteo-sarcoma:-

These may arise from the inner side of the periosteum, gradually lifting this membrane as the tumor grows. Since bone continues to form the tumor is inclosed in a thin shell of oseous tissue. The type may be round, spindle cell, or giant cell, or all these mixed.together. Tumors of this kind which are very cellular destroy the bone, break thro the ~~cxsuxx~~ capsule and invade the soft tissues. Those which start in the marrow cavity = myeloginous, these are often very vascular.

The usual place for development is where the shaft and articular end joins, the latter may be separated and lie free in the joint cavity, or the tumor may invade it and then enter the joint. Such tumors are commonest in youth and may be slow in growth and relatively benign; lasting for years without invading joints or causing much pain or general depression. In other cases they make rapid metastases, especially those of the lungs.

Melano-sarcoman-

Usually grows rapidly as a soft tumor, grey, or brown, or black, and is among the most destructive locally and the most rapid in metastases. There may be a general sarcomatosis with black secondary tumors in all of the organs of the body. The pigment is amorphous and granular, usually contains sulphur, often iron as well. So much is formed that it may float free in the blood and the urine may be loaded with it, appearing smoky or black. The pigment spreads also by the lymph system and colors the regional nodes. Degeneration in the tumor is very common and may result in cystic cavities filled with ~~xxx~~ balck fluid. Melano-sarcoma starts in a tissue where pigment is normally made, hence most of them are formed in the coats of the eye or in the skin. One common origin is from warts and pigments moles which are meddled with and irtitated.

Lympho-sarcomas:-

These have small and medium round cells resembling lymphocytes and the slightly larger cells of the germinal areas. At times these are grouped in the tumor like lymph follicles. The~~xxxxx~~ stroma is a fine reticulum of branching con. tis. cells joining larger trabeculae and in its fine meshes lie the cells. This stroma may be imperfect or in places absent. There are two main forms:- localized and the general.

As a localized lesion primary lympho-sarcomas may start in a node or in one of the tonsils or in the submucosa. Usually soft, grows rapidly, infiltrates, and undergoes degeneration as fatty. It may begin in a single node as in the axillae, reach a large size and break thro the capsule; ulcerating when it invades the skin, and the patient may die with profound anemia before there are many metastases.

In the generalized form node after node of a region will enlarge making irregular masses under the skin. This often starts in the cervical nodes, then others at a distance enlarge and soon the liver and spleen also.

After a preliminary soft stage these tumors ~~begin~~ become more fibrous and dense. This condition is separated from leukemia and Hodgkin's disease under the name of malignant lymphoma. Hence we have three conditions easily confused:-

(1) Leukemia with lymphatic hyperplasia, the formation of lymphoid tissue in abnormal places, severe changes in the blood, having fewer ~~x~~ r.b.c. and more w.b.c. and abnormal varieties of both.

(2) Pseudo-leukemia or Hodgkin's disease, with lymphatic hyperplasia, fewer r.b.c., not so much leucocytosis, the lesion is almost confined to the lymphatic system, usually an indolent form of tuberculosis from a bacillus of moderate virulence.

5. Lymphosarcomas:-

A true neoplastic process with metastasis, especially in the lungs and with a tendency of the tumor in the nodes to break thro the capsule and invade soft tissues; with the blood changes of secondary anemia.

4-24-07.

Epithelial tumors.

A. Of mature type.
1. Arising from investing epithelium.
Papilloma.
Hard.
Soft.
2. Arising from glandular epithelium.
Adenoma.
True.
Cystic.
Papillae.
B. Immature type.
Immature.

Papilloma: comes from

Here there is a stroma which carries the vessels and upon its subdivided projections there is an epithelian investment of cells. These fibrous projections may thick and blunt, cylinders or long branching strands, or many fines points upon a common base. In the axis of each there is a vessel with one or more accompanying veins and in the finest branches there may be both capillaries and lymphatics. The investing epithelia may be of any kind, flat, cylindrical, or ciliated; sometimes in one layer, sometimes in many. It is important to recognize that the relation between the stroma and epithelium is practically that of the external surface, Even where epithelia seem to be mixed in with the fibrous tissue, owing to the way the section is cut, there is no invasion of strona.

In most cases the origin of papilloma is a hyperplasia of vessels and con. tis. and the epithelia increase in order to cover these new formations. In the papillamy adenoma the contrary may be true, the the proliferation of the epithelium being followed by the growth of the stroma into the mass of cells. We divide these into hard and soft.

a. The hard the hand is most common on places covered by a pavement epithelium, as the skin, and the mucosa of mouth, and laryns and cervix uteri.

b. The soft are more common where the epithelia are cylindrical or cilliated, as in the nose, bladder, stomach, and uterus.

Many of these tumors are connected with chronic irritation and often develop near ulcers and scars.

Clinically they are benign as a rule, but may recurr after operation and in some cases the epithelium passes thro atypical changes and form carcinoma. The maligpant papilloma forms cauliflower growths in the uterus and ovary, bladder and larynx. In the larynx their size alone may make them fatal; in the bladder they lead to fatal hemorrhage.

The hard papilloma include warts, papillary nevus, accuminate chrondroma and horns. In warts a few papillae of the skin enlarge, chiefly in their length; they are very vascular and the epithelia covers several papillae in common, and is often very carneous. The warts are congenital or develop in child-hood, or youth. Accuminate chrondroma is most common in the external genitals usuall as small hyperplastic papillae. In both man and animals they may trannmitted from one to another, but have nothing do do with the true veneral warts or broad condylloma of syphilis. Horns are most common about the face and head, but may come elsewhere as on the hand and are almost confined to old people. In these there is a local hyperplasia of the papillae with an immense hyperkeratosis.

Soft papilloma may have short projections or long delicate ones with one thin layer of epithelium or many layers. The cells are cilliated, columnar, transitional, or irregular and metaplasia to cornea cells. Starting in the mucous membrane it is softer and more delicate and richer in vessels and cells than the hard papilloma. Edema is very common hence the stroma may apparently be mucoid. It may also be infiltrated with round cells. The tumor may carry up glands from the surface,

may degenerate and be lost, or multiply and make adenoma. Such tumors are common in the bladder, nose, alimentary tract and gall bladder. Frequently there is a catarrhal inflammation at the site of the tumor. In the bladder the tumor occupies usually the posterior wall,near the fundus. It has a broad base, and long slender papillae. Thesepapillae may break and cause severe hemorrhage, exhausting the patient. Carcinoma is often combined with it.

Tumors arising from glandular tissue:-

1. Adenoma:-

Here there is a combined new production of strona and epithelium; the latter is arranged as in a gland, either tubular or acini. The first element to proliferate is often the epithelium and the stroma grows into these buds as a cord later. The tumor may be circumscribed,and may have a capsule. It may lie wholly within an organ, or protrude from it or hang by a pedicle. These adenomas differ from the normal glands in several ways:-

(1)The stroma is either too much ot too scanty,richly cellular, or edematous or mucoid; at times it appears to be made up of granulation tissue. It often grows into the lumen as papillae; the vessels are usually numerous, often dilated. The epithelium may be in several layers, but usually has a good limiting membrane.

Tubular adenoma are commonest in the rectum, breast, kidney, and liver. The alveolar form in the breast and sebaceous glands. Follicular in the thyroid and ovary, and there are also compound forms.

The origin may embryonic and multiple; other forms arise with chronic inflammations.

Degeneratice changes are common, due partly to imperfect blood supply, partly to the secretion by the tumors cells which does not escape since these alveolar glands have no ducts. Clinically these are usually benign but cystic forms may cause serious effects by the large size. They grow slowly and seldom make metastasis. The malignant forms all belong to carcinoma. From ture adenoma we exclude the following:-

(1). Lactation hypertrophy of the breast, seen in both.
(2). Simple hyperplasia of the breast, seen in one or both.
(3). Diffuse and local hyperplasias on mucous surfaces as the tonsils.
(4). Excessive growth of sebaceous glands, forming wends and atheroma, frequently cystic.
(5). Hypertrophy of the prostate.
(6). Enlargement of the thyroid = goitre.
(7). Localized hyperplasias in large organs, especially common with chronic fibrosis.

True adenoma is most common in the breast, alimentary canal, and the thyroid. In the breast it is chiefly seen in female patients. It is strictly a fibro-adenoma, the proportion of strona varies from a hard fibrous mass to just enough to hold the other elements together. The tumor is benign, usually encapsuled. As a general rule the fibrous tis. is disposed concentrically about the epithelia and the latter rests on a good limiting membrane. Cysts are formed chiefly from the dilated ducts. These adenoma resemble bothe the chronic mastitis and the functionating breast, but the former makes thebreast small and hard and in the functionating organ the epithelium is loaded with fat droplets and the ducts contain either milk or chlosterum. A common complication of mastitis, which hinders diagnosis, is inflammatory swelling and hardening of the axillary nodes, and the desclimation of the endothelium lining the main lymphatics. This combination resembles early metastasis very strongly. In the liver adenomas may reach a large size, disturbing the circulation, causing jaundice, and acytes. With cirrhosis may be combined. In the alimentary canal adenomas are usually flat or polypoid, with little strona and many vessels; the bluk of the tumor consists of new glands, lined by high columnar epithelium, and many beaker cells. The tumor does not invade adjacent tissues. It is fairly common in the rectum during childbirth. Adenoma of the thyroid may arise before birth or late in life; may contain fibrous tissue in excess or be very vascular where truly glandular the tumor is made up of alveoli, filled with colloid material and lined by cuboidal or cylindrical epithelia except where

Pressure atrophies them. Another name for these tuors of the thyroid isStruma and one form is struma maligna because it both recurrs and makes metastasis.

4-26-07.

Cystadenoma or cystoma. We excluded from these any cysts which form either in normal tissue or in any other tumors. Such cysts may have three origins:- (1) They are either degeneration cysts from hemorrhages, necrosis or other softening; (2) or they are retention cysts by dilitation of previous canals or cavities by retained secretion; (3) or they develope in fetal remanants which usually atrophy like the urachus; paroophoran and the mesenteric duct.

Cystadenoma includes only cystic formations in neoplastic glandular tissue. These tumors may reach an enormous size and show all kinds os glandular structure, including alveolar, vesicular and tubular, either not dilated xxx or immensely so. Between the cavities the septa of fibrous tissue becomes thinner and at last disappears, leaving ridges on the walls of the compound cavity.

The orggin of the fluid may two fold:- either continuous secretion from the lining epithelium, which is retained; or transudation from the vessels. The fluid dilates the cavity and to keep pace with this the strona and epithelia continue to grow. But the pressure of the fluid in some cases will stretch and atrophy the walls, thenthey break. Cystadenoma are of two kinds:- (1) Muilocular and(2) Multilocular. In the multilocular there are numerous cystic cavities all of about the same size surrounded by a common envelope. In the unilocular there is one large cavity. But almost always a few small ones will be found on the wall as well as glandular structures which have not dilated.

These cysts are divided also into simple and papillary and both are common in the breast, kidney, testis and ovary. In the papillary form the strona makes projections into the lumen, either single or branched; short and flat or long and distended. The strona in these projections may fibrous or mucoid and the epithelia are often surrounded by several layers. In theyoungest it appears that the epithelia multiplies first as buds and the stroma and vessels grow into then later.

The contents of the cavity may be serous, vichin albumin or mucinous or colloid and hemorrhage may occur but not often.

Microscopically you find colloid corpuscles, r.b.c . and W,b.c. threads of mucin desclimated epithelium crystals. The epithelium on the walls may be high, sometimes cilliated or low cuboidal, with pressure they often flatten out and atrophied. In the cysts containing mucin the epithelium on the walls show many braker cells and are usually in one layer.

The most important of these tumors coccur in the ovary, on one or both sides, often enormous in size and weight. The inner walls may be flat making cystoma simplex, or the branched papillae may so fill the cavity that externally the tumor seems to be solid.

The stroma is fibrillary with many spindle cells, sometines also smooth muscle fibers.

There are inportant clinical differences between the two chief varietees od ovarian cystoms:- there is the glandulat with tubules lined by cylindrical epithelium, containing mucin or pseudomucin, and these are benign except that a tumor of a 100 pounds weight may cause serious pressure effects or they degenerate and rupture and then may be fatal. The other kind is the cilliated papillary with epithelium in several layers, containing serum which is colorless or yellow or stained with blood pigment. These are malignant for after a time he papillae grow thro the capsulein the reverse direction appearing as a cauliflower mass on the serous surface of the tumor. From this the entire surface of the peritoneum may be sown with countless papillary tumors.

The origin of these ovarian cysts is very uncertain. They may start from the graffian follicles, in Gertner's ducts, paroopheran, or in Koberts tube.

Epithelial tumors of the immature type.

(1). Carcinoma:- In these the relation between the strona and the epithelium is no longer preserved and this is due to the unlimited proliferation of the epithelium. These cells invade other tissues, follow the line of least resistance and hence are found advancing along lymph channels, less often along vessels and ducts. In addition to this abnormal direction of growth the cells are atypical, larger or smaller than normal epithelium, with excess of chromatin, rapid and irregular mytosis and a great tendency to break down. Hence the definition of a carcinoma:- a neoplasm made up of con.tis. and epithelial cells arranged atypically, the latter multiplying by atypical mytosis and with a tendency to transgress normal limits.

The strona is often a network of fibrous bundles, have several surfaces, each slightly concave with sharp angles. The strona may be made from persisting tissue or may be newly formed, as the tumor grows. In the former case it will contain whatever was there before the tumor, as fat, cartilage, nerves, etc. It remains passive for a while, being invaded, or an inflammatory reaction may cause it to resemble granulation tissue. With many and large vessels the tumor may be cavernous and hemorrhagic. In rare cases the strona so compresses the cells that the tumor heals at that point. This has no value for the whole tumor for in other parts it is growing.

Degenerative changes in the strona are common, including suppuration, fatty, calcareous, and mucoid.

The parenchyma is the most important element. This lies in the spaces of the strona and where the tumor invades other tissues these alveoli are usually dilated lymph spaces. In the early stages they may show a lining of endothelium, later these are lost by pressure atrophy. Where the tumor is making its own strona we do not find these endothelia. This alveolar structure is important in the recognition of cancer but may also occur in endotheliomas.and some sarcomas. The shape of the alveoli depend upon how the columns of cells are cut; if directly transverse their outline is circular: other sections may be oblique or longitudinal. But as a rule they communicate freely with each other. The size and shape of the cells depend upon the mechanical conditions as to pressure, and on the degree of immaturity. In the uterus and alimentary tract they may be cylindrical, in the liver they may resemble hepatic epithelium, or are flat and horny in the skin; cuboid in the thyroid. They often retain a trace of their function if the rate of growth is not too rapid. Hence in the skin they form horny bodies" of corneus scales. In the stomach and gut they may make mucin; in the liver bile.

The cytoplasm is usually finely or corasely granular, vacuolar, where secretory products or other cells have been and these cells which occur inside of cancer epithelium may be w.b.c. from blood or smaller cancer cells, e.g. that is the tumor cells may be actively phagocytic. The nuclei may be round or oval, usually hyperchromatic, like those of the tissue of orgin or very abnormal, often with several nucleoli. With very rapid mytosis a kind of giant cell may form. As a rule the proportion between the nucleus and cytoplasm may be like the ordinary epithelium. Rarely the cells appear to be all nucleus. The proportion between strona and parenchyma gives us three kinds:- (1) Medullary or enchepaloid, where there is far mor parenchyma than strona; (2) The serous or fibrous carcinoma, with strona in excess; (3) carcinoma simplex with the proportions like those of a normal gland.

The gross appearance may vary within wide limits. On a surface the tumor may be polypoid or with a broad base (sessile), or fungus, or papillary or lastly a diffuse infiltration. On scraping a fresh section we obtain the socalled cancer juice, composed of fluid and epithelium and this is one of the old distinctions betwee carcinoma and sarcoma. The cancer cells lie loosely in the alveoli and hence are easily scraped out, especially in the very cellular forms.

The color of the tumor may be white or grey, red if vascular, pigmented, often hemorrhage, yellow if fatty, and transparent grey when mucoid.

Deggneration of the epithelium is particularly apt to occur be-

cause they lack the normal relation to the vascular supply, and also for other reasons; among these are the rapdi growth of the epithelium while that of the vessels is slow. The vascularity of the part invaded, the pressure against the growth progress, thermic, bacterial, and mechanical irritation, the action of gastric and other fluids, when the tumor is in he diggstive tract and other special factors.

5-1-07.

I. Carcinoma on the external surface.

Some of them begin in the sebaceous glands, some in the sweat glands, but most of them in the flat cells of the epidermis. To these thename of "cancroid," "Flat or pavement cell cancer," "and badly, Epithelioma" are given .

Microscopically there are solid masses of cells derived from the retae Malphigiae. The masses may be slender branching columns, or a net work, or broad plugs of large extent. They tend to spread deeper thro the lymphatics of the papillary and reticular layers of the corium. These cells are usully large, flat, with a largg or oval hucleus, sometimes more than one nucleolus. They seldom have prickles, and are usually arranged without order. But in the more slowly growing there are longer oval cells at right angles to the strona, and here we find most nmmerous mytosis. Next to these are flat cells and in the middle of the masses corneus cells. From pressure and drying the middle cells may be packed ti ght together in "whorls" or "pearly bodies", which take the eosin of an H. E. stain and the Picric acid of a V.G. stain. Whne present they mean that the cells are growing slowly enough to make kerato-hyaline, as they normally do. It is important to recognise that the presence of these onion bodies or whorls is not necessary for a diagnosis of a flat carcinoma. In the most malignant we do not find them because the cells are multiplying too fast to make corneus material.

Ulceration is common and hence the stroma presents polymuclears and other w.b.c. and these may enter the epithelium actively or passively.

In the gross we find a local thickening of the skin, of a greyish color, slightly raised, of greater extent below the surface, and the more malignant the deeper the infiltration. On the surface a blister may form and discharge serum. Most often the surface ulcerates and slowly progresses with a sharp rise on the well side and a sloping toward the middle of the ulcer.

Such ulcerating cancer is commone about the face, especially eyelid, nose, angle of mouth and lower lip. The most superficial and slowest formed = Ulcus Rodens or rodent ulcer. Other flat cellcarcinomas occur on the tongue, cheek, larynx, cervix, and external genitals.

II- Carcinoma of mucous surfaces - May have two orgins; if they start from the investing cells they are flat cell tumors as described; others begin in the crypts of mucous follicles and belong among the cylindrical cell cancers. These tumors are espceially frequent in the alimentary tract, cervix, and body of the uterus, gall bladder and ducts. The more fungus kinds are called the X Cauliflower cancer.

Microscopically there are [illegible] gland like alveoli with one or several layers of epithelia and [illegible] beaker cells among them, and with papillary outgrowths into the lumena. These may also be covered by several layers.

They closely resemble adenoma but in the latter there are seldom many layers of epithelium; they are more typical in shape; and arrangement; there is a good limiting membrane and not tendency to invade the stroma.

III- Carcinoma of glands: Those with cylindrical cells are found in the digestive tract, ovary, and lung; those with cuboidal cells in the breast, kidney, thyroid, and prostate; those with polymorphous cells occur in any gland, large or small, if the anaplasia is well marked.

We have two main kinds:- (1). Adeno-carcinoma: (2) Carcinoma glandulare solidum.

(1). Adeno-carcinoma:-

This is a very frequent form in the digestive tract, uterus, breast, and ovary. It takes its name from the arrangement of the stroma and a parenchyma, which suggests a normal gland. This arrangement may be found only in the early stages and the whole picture is that of a destructive epithelial proliferation without well marked characters, The degree of destruction varies; in the slow growing forms which resemble glands most nearly, the main feature may be that of a gland lumena, which are found where they normally never occur, as among the muscle fibers of the stomach wall. These are called adenoma destruens Their stroma may be atypical and the gland lumena have not ducts. Its lumena may be tubules, single or branched, or wider alveoli or labyrinths. Their epithelium at times is in a single layer either cylindrical or low. But even with this arrangement, in some lumena, you are apt to find many layers, perhaps projecting from the wall as buds. There may be some kind of secretion in these gland structures, the product of cells and also due to degeneration of both stroma and cells. Great accumulations of this may distend the glands to cysts, making the cysts- carcinoma.

(2). Carcinoma Glandulare solidum: Here the cells are less mature and are not grouped about the lumen but lie in solid columns as polymorphous epithelium of great irrgeularity. The stroma may be well developed or scanty, and if the latter the tumor is as vigorous in growth and destructive as small round cell sarcoma.

These tumors occur in the breast, uterus, ovary, and stomach and make large destructive ulcers on surfaces. From their many imperfect vessels bleeding is an important sympotm, making Hematuria, Hematemesis etc, With the stroma in excess = Sirrhous, and resembles and dead scar both in the gross and microscopically. The fibrillar carcinoma are most common in the stomach and breast. In the latter they tend to contract and invert the nipple; they seldom ulcerate and metastasis is slow. Often the only carcinomatous parts that can be recoginzed microscopically are along the growing edge.

A special form of this fibrous carcinoma Glandulare Solidum occurs in the mucous membranes, especially of the stomach and the coecum and undergoes early mucoid degeneration, both in its cells and in its stroma. It hence appears as a greyish, semitransparent mass of jelly = carcinoma gelatinosum.

THE SPREAD OF CARCINOMA

Extension does not take place by the conversion of adjacent tissue into tumor tissue but solely by the proliferation of tumors cells. Hence no matter how large the tumor or how great the invasion of the tissue, the tumor has grown out of its own cells. In the loose tissue, like fat, the spread may be rapid; in the dense tissue, like fasciae, cartilage, etc. it is very slow. But an inflammatory reaction and formation of granulation tissue lessens the resistence ahead of it and favors its spread. Lymph spaces are always invaded early, but extension along ducts, as those of the breast and liver, along the lymph sheaths of vessels and along nerves and plabes of fasciae may also take place as a continuous or an interrupted spread. Regional lymph nodes are almost always involved, hence with a breast carcinoma we find large and hard lymph nodes along the lower edge of the Pectoral muscles; in the axillae; and above and below the Clavicle. The tumor may also extend straight thro the chest wall to the pleura and lungs.

The first parts of the node to show the extension is just under the capsule in its sinuses. This occlusion of lymph sinuses holds back the spread of the tumor for a time.

The direction of the spread is sometimes retrograde, against the normal direction of the lymph stream.

Metastasis thro the blood vessels, if it takes place, is by capillaries and veins as a rule, for the arteries are of denser structure and more resistant. The spread may occur along the vessel's lymph sheath and later rupture its wall into the lumen. Ulcerating cancers often open small veins and then the clots which form in these are partly

blood and partly tumor cells. The spread may become very rapid when this occurs, and hence a small tumor of the pylorus may fill the liver with secondary nodules which are both larger than the primary tumor and in their total larger than the bulk of the liver remaining.

If carcinoma opens into one of the larger body cavities it is often repeated as small nodules very numerous and under the surface wherever the endothelium has been removed. Also groups of cancer cells may block the mouths of stomata and thus enter the lymphatics.

CLINICAL FACTS.

Carcinoma is a disease of adult life, especially between forty and sixty, with the highest mortality in the fifth and sixth decenium. The organs vary in frequency of attack so the digestive tract is most involved between 50 and 60; the breast and uterus between 40 and 50; the skin as late as 70 or older. A very few cases of early carcinoma are recorded, but such tumors are usually compound with epithelia as only one of its elements.

The general frequency was estimated as 431 per million in 1872, which rose to 580 per million in 2002 and is still rising . Carcinomas are more common in females that in the males in the proportion of 60 to 40 %. This excess of females is due to the great liability of the breast, uterus and other genitals in women. The organs most involved in women are the uterus, breast, ovary, gall bladder, and the liver. In men the skin, lower lip, digestive tract, and larynx. Taking both sexes and all organs a scale of frequency is as follows:- (1) uterus, (2) external surface, (3) breast, (4) stomach, (5) rectum, (6) oesophagus (7) ovary, (8) external genitals.

5-3-07.

The clinical course of any carcinoma is that of a lesion with a tendecy to local mischief by destruction and ulceration as well as liable to form distant metastases. One which we can seldom arrest definitely because of its tendency to recurr. But clinical course is subject to great variations and with the less malignant this is important in treatment.

Carcinoma of the skin may be very slow in development, with but little tendency to metastasis, and the best example of this is rodent ulcer, which may last ten or more years. Cirrhous of the stomach and sigmoid flexure is also very slow and gives a chance for complete cure by operation. It is difficult to say what determines the malignancy of one tumor and not of another. But in general we recoginze that carcinoma is always a malignant disease and that the propect for life for more than 2 or 3 years after the diagnosis is made is not good. This period may be shortened still more by hemorrhage and other causes. The only hope for the patient lies in early and thorough operative removal. No internal medication or salves or cancer pastes are reliable. The X-ray may be used but is unsatisfactory. A deep seated cancer, as in the stomach or abdomen may first be brought to the surface by an operation and then exposed to the full power of the X-ray. Injection of tumors by the toxins of Bacillu Prodigeosus and pyogenic forms, intentional infection with erysipelas, injection with trypsin and other ferments have had their advocates and published cures but should not be used, or considered if a thorough operative removal is possible. One strong aggument for such operation may be stated as follows: "the longer the tumor is left the more certain is the recurrence." The recrrent tumor often shows more anaplasia than the original one. In just that proportion the course of the lesion is more rapid and deadly and hence the best conditions surround the tumor on first recognition.

Recurrence may be explained in one of the ways:- (1) The first and most common case depends upon minute portions of the tumor tissue left behind at operation, most often in ner by lymphatics. Such minute foci of cancer may lie in the skin or elsewhere at some little distance from the main tumor. Some others result from the advacne of the tumor thro the lymph spaces in the reverse direction simply because that is the lines of least resitence. These foci may remain quiet for a long time until new irritation starts then proliferating or the local congestion of healing stimulates them with excessive nourishment and the

and tumor comes back in the scar or even in the granulation tissue.

(2) Is the inoculation of the field of operation by tumor cells, as the edges of the abdominal wound or denunded peritoneum, during removal of uterine cancer. This practically an artifical metastases and is rare but has occured.

(3) A new tumor may start in the same tissue which furnished the first because of a local disposition to tumor formation, not because bits of the first tumor were left behind. This will explain recurrence after long periods. It is hoped as a general rule that the danger of recurrence ends with the third year after operation.

The effects of carcinoma are partly local and partly general.

The local effects depend upon the degree of infiltration and consequent destruction, and this is realted to the degree of anaplasia in the tumor cells. With ulceration the local hemorrhage, infection of pus, organisms, and absorption of toxic material still further increases the effects.

Constitutional effects depend upon several conditions:- Among these are the importance of the function of the part involved, and whether it is a single or a paired organ.

The physical form of the tumor is also important, for those which make definite nodules, leaving part of the tissue free, are less harmful than those which infiltrate. In organs which have an internal secretion, like the adrenals and pancreas, the effect will vary as this is lost, or in part saved to the general metabolism. Hence a cancer in the tail of the pancreas produces worse general effects than one in the head of the organ , because the islands are from 3 to 5 times as numerous in the tail as in the head.

Among the mechanical effects they may narrow or close orifices or canals like the oesophagus, and pylorus; they may contract a hollow organ as the stomach and press upon important structures, as the trachea, ureter and large vessels.

Another danger lies in the rupture of tumor and this may be a cause of sudden death, as when a cancer of the stomach breaks into the peritoneum, or one of the oesophagus opens the trachea, causing suffication or asperating pneumonia.

With the local destruction there may be repeated hemorrhage or a single fatal attack, and the bleeding is especially important with carcinoma of the stomach, gut and lungs, ureters and urinary organs. Ulceration further weakens the patient from the continued suppuration and the absorption of pubbied products. An almost constant feature of carcinoma is the cachexia. This is often most marked when the tumor is in some part of the digestive tract, and the nutrition is so poor that the drain caused by the hemorrhage, suppuration and septic absorption can not be made good.

The tumor cells make various ferments and toxins and these readily enter the circulation because of the tumors relation to the lymph channels Amylase, Lipase, Catalase and peroxidase and the rapid autolysis seems to show that th e ir cells contains proteolytic enzymes. With these ferments products of cell degeneration also enter the blood and hence the patient excretes more nitrogen than is furnished by his diet. Such enzymes will explain why a small non-ulcerating carcinoma will sometimes cuase a severe cachexia.

The tumor tissue contains more P and Fe than normal tissue, and the most rapidly grwoing contains more K than Ca, in the proportion of K2 : Ca1 or K3 : Ca2. Certain hemolytic bodies can be isolated from the tumor cells and these may help to explain the accompanying anemia. The blood shows a decrease in r.b.c. and Hb.; and increase in polys; especially with ulcerating tumors; sometimes increase in eosins. A decrease in lymphos and many degeneration forms among the w.b.c. but the blood findings are not always uniform. With cancer of the stomach a normal leucocytosis of the stomach may be lacking.

Etiology of carcinoma.

Virchows theory of irritation supposes that slight and repeated stimuli may tend to cause cancer. For this many clinical facts can be ~~sighted~~, cited thus carcinoma frequently appears in organs normally subjected to periodic stimulation, as the breast, stomach, and uterus. It is frequent at points liable to slight injury, as the lower lip in pipe somokers, and the gall bladder with calculi. Exposure to chemical stimulation in certain trades has a similar effect. In the edges of slowly healing wounds, fistulae, ulcers, burns, and chronic eczema in the gut with chronic constipation and piles; cirrhosis of the liver; the breast with mastitis; and the stomach the peptic ulcer, and sometimes with specific lesions of syphilis and tuber culosis cancers may be found developing. It has been asserted that patients do not have cancers and tuberculosis at the same times. This is a mistake, for the two diseases are not mutually exclusive.

Cohnheimstheory supposed that carsinoma take origin in misplaced fragements of embryonic tissue. This may be supposed to occur where fetal relations are complicated and different kinds of epithelium meet, e.g. a group of pancreatic cells inclosed in the stomach wall may later develop to carcinoma of pylorus, and similarly a group of cells from Gartner's duct may be inclosed in the uterus or vagina.

In some families there appears to be an hereditary tendency to form extra embr yonic tissue and for these to separate from normal relations. But heredity has be en much exaggerated. This is especially clear if we follow tumors of some organ thro several generations of - carcinoma fami ly. The number of such is small. The numbers of such is higher if the tumors of all organs are included in the figures but not out of proportion to the prevale nce to tumors generally. The probability that a cancer patient will have cancerous children is estimated at 1 tp 26. In one large series of cases horedity was demonstrated in only five per cent.

Hypernephroma:

In the adrenal gland there are general hypertrophies and hyperplasias and also more frequently more localized nodules of soft consistence and yellow color. These occur in either cortex or medulla and contain atypical adrenal tissue usually ar ranged as in the cortex. The cells are large and contain much fat and are grouped in glommeruli, parallel columns or a net wark, according to the layer pr oduced. In other hyperplasias the cells are larger, of irregular form with variable nuclei and not grouped like the normal gland. The cells may have more than one nucleus and may be arranged in a double row about the lumen which is normal in birds but never in the human. Such tumors are called strona suprarenalis or adenona of the adrenal. In the most anaplastic of these tumors the malignant characters are very distinct. They attack neighboring tissue as the kidney, break into veins and cause wide metastases especially to the lungs.

Hypernephroma may start in misplaced parts of the adrenal, as in the upper pole of the kidney; in the solar or renal plexuses of the sympathetic along the spermatic or avarian ~~xxxxxxx~~ veins; in the broad ligament on in the testis. From such fragments a ~~xegin~~ benign or a malignant tumor may develop.

In the groos the hypernephromas are usally yellowish to a sulphur yellow; composed of small labules with con. tis· septa and very vascular.

Microscopically they contain much glycogen and lecithin and fat. Hemorrhages are frequent and the commonest metastases are thro the veins, to the lungs liver and bones.

Clinically they are most common after the 40 year; and are frequently diagnosed at autopsy. They may begin as benign tumors and after a period of growth become malignant.

Commonest of all places, outside of the adrenal itself, is the upper pole of the kidney; the rest of the organ suffers from compression and may be the site of nephritis as well.

CHORIONIC TUMORS

Portions of the placenta may remain attached to the uterus after abortion or labor at full term. These may develop to benign placental polypi. They acuse a good deal of hemorrhage and prevent the normal involution of the uterus. (2). In some cases they show a tendency to invade the uterine wall, making a destructive placental polyp. These cause severe local bleeding and at times septic symptoms. (3) Or they may develop in the early months of pregnancy just before spontaneous abortion or following full term delivery, immediately or after an interval. There is severe repeated hemorrhage, a putrid discharge and an early profound anemia. Then rapid metastasis thro the veins, especially to the vaginal wall, and the lung, in the latter place causing hemoptesis. The disease is rapidly fatal and the tumor has received a number of names;- Deciduoma; Syncytioma malignum etc.

In the gross at the placental site there is usually a more or less fungus mass breaking down easily on handling, mingled with clot and on section it may be found perforating the wall of the uterus out to the serous caot. With extra-uterine pregnancy such a tumor may form on the wall of the Fallopian tube.

Microscopically there are two chief elemtns:- (1) The syncytium cells and (2) the Langhans cells. The syncytium cells are arranged into trabeculae with many nuclei, but not divided into separate single cells. Between these in the irregular spaces are lighter vacuolated cells with but little chromatin but rich in glycogen = Langhans cells. Similar groups of tumor cells may be traced into the veins or close to them, and bythis times, as a rule, the diagnosis is made too late, for the veins some where have been entered and metastasis has begun. The tumor has no vessels of its own, but is peculiarly malignant from its relation to the placental sinuses and maternal veins.

MIXED TUMORS:-

These contain more than one kind of tissue proliferating in a neoplastic way and henne may have more than one parenchyma and more than one stroma. The simplest to understand are those which contain derivatives of all three layers of the embryo. If these tissues are very rudimentary = teratoid growth; while if more tissue or parts of the embryo can be found= teratoma.

Many mixed tumors are congenital or formed in early years; they may be bilateral and symetrical and usually contain tissue which resembles embryonic more than adult.tissu e.

We find in general the following conditions of things:-

(1) Tridermoma.
  a. contains partial embryo = embryoma or teratoma.
  b. contains rudimentary tissue =
(2) Bidermoma- either ectoderm or mesoderm is lacking.
(3) Tumors from one layer.
  a. ectoderm = dermoid cysts.
  b. mesoderm = ——————.
  c. Endoderm = Branchiogenic cysts or Entero Cysts.

(4) From the mesenchyme alone.

Dermoid cysts:- Tumors of this kind have one or more cavities lined with epidermis, resting on papillae and these on fibrous tissue. This lining epithelium shows, horny, granular, and pigment layers, hair follicels and sebaceous glands. The contents of the cavity is usually thick, contains nich fat and numerous hairs. These dermoids have been divided into simple and compound, and one variety of the simple is the epidermoid cyst, showing no deeper skin layers. The compound dermoids contain more than skin tissue and hence belong to the teratomas.

Dermoids are common in the cutis and subcutis, especially where the surface is folded in and near the fissures of the embryo but have been found within the skull and spinal canal, in the second branchial cleft, thyro-glossal duct, omentum, mediastinum, peritoneum and pelvis. Such tumors in the ovary and testis form a class by themselves. In the testis they are uncommon but usually lie within the gland, surrounded by remanants of the testis with the usual contents, but somewhere on the wall there is a prominence which contains practically all the embryonic elements, including nerve tissue, and bits of organs of special sense. Hence the origin must be the inclusion of one fetus within another and they are called fetus infetu, or embryoma or teratoma. In the ovary they are partly in the organ becoming impedicled as they grow; they are often bilateral and multiple. In cone case there were seven in ovary and four in the other. These are among the commonest ovarian tumors. May be congenital or occur in late life.

The following parts have been recognized in these ovarian dermoids:- Parts of the skull, mouth, digestive tract, teeth, bones, vertebrae, salivary glands, etc. Carcinoma and cystoma may occur in the same ovary with these dermoids.

Branchiogenic Cysts:-

These occur most commonly on the sides of the neck. They usually have a wall of con. tis. lined by several layers of flat epithelium and at times papilae, sweat and sebacecus glands can be found. The contents is usally thick and fatty. In another kind you have adenoid and vascular tissue on a fibrous capsule, lined with columnar epithelium, which may be ciliated and the contents either serous or mucous

Such cysts are multi- or unilocular and are congenital but are seldom prominent until late life. The commonest complications are :- inflammation, abscess formation and carcinoma.

Entero Cysts;-

These occur in the cranial cavity, breast, abdomen (from endoderm); are uni- or multilocular; lined with a mucosa like that of the intestines, perhaps with cilited cells.

In the brain they are supposed to arise from portions of the nural tube, which becomes snarred off, and their cavities communicate with the ventricles.

In the nose, pharynx, floor of the mouth, and the cervical con. tis. they may arise from the second branchial cleft.

In the pleura such a tumor may arise from either the trachea or bronchi and may be compound. Other examples are found in the belly-wall, liver, buttox, and the femalegenitals.

**********Finale**********

Don't forget that I will be doing business at the old stand next year. Wishing all my patrons the best of luck, I am,

Yours very truly,

M.H. Boerner.
5-8-07.

N E R V O U S D I S E A S E S

HEMIPLEGIA:- Especially cerebral apoplexy, Formerly the term apoplexp was also used to designate pulmonary hemmorhage but is not much used now in tha t connection. Apoplexy is a cerebral hemorrhage but the term is also used to designate cerebral softning from embolism,thrombosis for they may present the same symptoms. Hemorrhages into the brain may be, dural hemorrhages (epidural),pial (subarachnoid), central (hemorrhages into the brain substance), hemorrhage into the pons,cerebellum and medulla. The destinct feature of the brain is that there are practically four groups of blood vessles from which the hemorrhages may occur. 1st. Vessles of the dura. 2nd. The pia. 3rd. Basal ganglea,internal capsule,white matter,pons and medula. 4th. Cerebral hemispheres.

Etiology:- 1st. TraumaticIt may occur at birth due to difficult or prolonged labor or to the use of forceps. 2nd. Age, 75-80% of the ordinary central cerebral hemorrhages occur between the ages of 40 and 80 but may occur at any time of life. 3rd. Sex. It occurs more often in man due to syphilis and alcoholism. It is more common in civalized white races. More frequent in temperate climates and in cold weather due to the extra exertion. Heredity plays a distinc causl role. Infections like typhoid fever and whooping cough may produce it. 40% of the cases are assotiated with nephritis,(should be 30%),25% with syhphilis. It is often assotiated with gout rheumatism and alcoholism,(alcoholism does not always mean drunkness). It may be assotiated with cardiac diseases as hypertrophy,aortic stenosis,vegetation on the valves,and arteritis. Debility, especially that assotiated with anemia,scurvy and purpura. The physical conformation of the patient has a desided bearing;stout people with thick short,fat necks,red florid face and a full habit seem to be predisposed. Sudden strain or violent emotion or sudden exertion. At times the exertion is not very violent.Defective congenital vessles may play a x causal role.

Symptoms:- At times though rarely prodromal symptoms are present. They are liable to be present in syphilis. When they are present there is faintness,numbness in the hands and feet and limbs,diziness and weakness,pain or fullness in the head,loss of memory,at times confusion, nausia,vomiting,nose bleed,irregular hearts action,bad taste in the mouth. These cases are far more frequent n among people who live in cities than those who live in ther country.

Acute cases occur when there is sudden uncontiousness or coma with or without convulsions,uncontiousness,full red face,stertorus breathing and hemaplegia. The convulsions occur more often in meningeal hemorrhage. They start on the affected side and may sweep over the entire body when they become general. On recovery the patient tells you that he felt diziness and faintness before falling. In these conditions the pulse is usually full,hard the blood pressure goes up to 200 Mm or higher, the face becomes flushed,stertorus breathing,puffing of the cheek on one side. The breathing may be soft and blowing or you may have Cheyne-Stokes resperation. The eyes are usually closed and rigid. The pupils are contracted and may be unequal. The eyss often show conjugat deviation. Tosis may be present but it usually dissapers in 1-2 days. In many cases there is very free prosperation. Incontinancy of the feces or retention of the urine and feces are frequently met with in these cases. Albumen may be present in the urine without there being any nephritis. The temperature is subnormal at first but goes up in a few days and is highest on the affected side. The temperature may go up to

103 or more. It gets back to normal again in from 10 days to one month. Speech is difficult or lost. The patient has difficulty at swollowing or may not be able to swollow at all. There is paralysis of one side of the body or the paralysis may be crossed (arm and leg on one side and face on the other). The upper fibers of the facial nerve are not usually involved. Sensation and motion are lost at first,it is a flaxid loss of motion at first. In some of these cases death comes on suddenly from paralysis of the respiratory muscles or fom the extent of the hemorrhage. In most cases death don't come on for 3-4 days and is usually then due to pneumonia. The coma lasts from 3-4 hours to 5 days. Aphasia of the motor and sensory type is present. All reflexes,deep and superficial are lost. The muscles which carry on bilatteral movements (resperation) are weakened. The regidity which is enitial ~~i~~ as in a large hemorrhage into the hemispheres (ventricular) or cortex (menengeal),is followed in 3-4 weeks by contractures. In 3-4 weeks the reflexes come back and the deep reflexes are apt to be increased. In nearly all hemiplegias the arm is more affected than the leg and the leg more than the face. The contractures most severe in the extremities,the fingers suffering more than the wrist, the elbow more than the shoulder,the toes more than the thighs. The gate is characteristic;there is a draging of the toes,the foot being draged in a swinging circular manner with each step. Later on the face is apt to be drawn toward the sound side. The affected muscles do not atrophy but do not keep up with those of the sound side. Motor disturbances occur. Tremors are present which may be so severe as to cause assntiated movements on the opposit side. Ataxia is often present. Coreic movements are present in any or all of the muscles on the affected side. Apathosis, the muscles get spastic and have painful contractures. There are no changes in the electrical reactions,especially not at first. Hemianesthesia may be complete. If present it goes away more quickly than the hemeplegia. There may be hemianesthesia for a few days and then dissapear from all the parts except the hands and feet. Paresthesia may be present in the affected extremities causing burning and tingling pains. Often the joints affected show arthritis. There vaso motor disturbances on the affected side as sweatting. Trophic disturbances are manifest as is seen in the loss of hair. The mind is always noticable affected. The memory is imparde,perseption is lost,they are easily irritated,they laugh or sry without excuse,they may go on into epilepsy or insanity.

Meningeal Hemorrhage:-This differs from the central hemorrhage. It is much oftener traumatic. It is epi or sub dural,and usually occurs in alcoholics and in the insane. It is more gradual in its onset, except in the traumatic form. The patient gets listless,dull,there is a feeling of somnolence and in a few hours the patient is comitosed. Hemiplegia occurs in the side opposit the clot. The sensory paralysis is not as common or complete as ~~in~~ the motor paralysis. The hemorrhage occurs usually from the middle menengeal artery or vein. In the central hemorrhages the reflexes are often increased and regidity is present. Sp Spasems of the eyes,face and limbs occur. The pupils are contraced especially so on the affected side. At times we have Hutchin's pupls (dilated on the affected side and contracted on the opposit),it indecates severe injury to the third nerve. There is often conjugate ~~fm~~ deviation, pulse of high pressure,it is slow and full. Resperation is slow at times stertorus. In a large hemorrhage we have Cheyne Stokes resperation The temperature is elevated to 102@3°. Aphasia occurs on the affected side. This trouble is prone to occur in the insane and in general paresis.

Pial Hemorrhage:- These hemorrhages are less complete in the paralysis which they produce. They show spasms of the Jackstonian type.

Hemorrhage into the Pons. These are important. The coma is sudden;there is jerking of the limbs;regidity. The pupils show pinpoint contractio. Resperation is slow. The temperature goes up to 103°-104° quickly. Speech and swollowing are impossible. The patient may have had a bad headach,malays and vometing before the hemorrhage occured. There is often twitching of the muscles,strabismus,myosis,conjugate deviation cross paralysis and cross anesthesia.

If he gets well or survives there will be left behind disequilibreum and ataxia

Cerebellar Hemorrhage:- 1 - 2% of these cases are fatal. These hemorrhages are often preceeded by headach followed by sudden coma with vometing and stertorus breathing. Swollowing is difficult or impossible. Movements of the eyes are disturbed. The hemiplegia is on the same side as the lesion. Virtego disequilibreum,perhaps fits and spasms may be present.

Pathology of cerebellar hemorrhage:- They are due to degenerative arteritis,fatty degeneration,atheromatus conditions are found in 1/5 % of the cases. Fatty degenerations are found especially in the infections,as purpura scurvy,leucocythemia,hypertrophy of the heart is often prosent,all playing a

sausal role. After the hemorrhage there is coagulation then softning and then absorbtion. In 10 days there forms a fibrous tissue wall around the clot which contracts and in 30 - 30 days we have a cyst followed by secondary degwneration of the nerve cells. This explains the sudden fall and uncontiousness and loss of reflexes due to irritation.

Diagnosis:- Here we must differentiate alcoholic coma;it may be both. Uremic coma remembering that it also may be assotiated with cerebellar hemorrhage. Opium coma,epilepsy,hysteria,embolism and thrombosis must be differentiated. In an alcoholic coma we can usually get an alcoholic history and the alcoholoc breath from the patient. The patient is not so deeply uncontious and can be partially aroused. The pupils are usually dilated and Equal,unless it is prolonged when they may be contracted. There is no hemiplegia;no change of temperature,etc.

Uremic coma:- There is not much in the breath of these patients but we do have a nephritis. The pupils are equal.

Opium poisoning:- Here we have slow resperation,pinpoint pupils,history of the drug cynosis,etc.

Epilepsy:- It may be toled by the scars which are usually present on the patients head and toungue from falls in previous attacs. He may be uncontious but is not paralyzed. The temperature is normal.

Hystory :- Previous flaxid condition on the affected side. No paralysis. not much hysteria. It is hard to differentiate from embolysm and thrombosis. Embolism occurs early in life and from heart disease. Thrombosis is hard to differentiate but here you usually have a previous hystory of syphilis.

Prognosis :- This is variable. Some die in the 1st.,2nd or 3rd.month. At times they die in 3 - 4 days of pneumonia. They may have a lesion of the phrenic nerve. An abscess set up in the hemorrhage and cause encephalitis. The prognosis is governed by the improvement.

Treatment:- In heraty men and women put them to bed and an ice bag to their head. Keep them quiet;apply warmth to their feet and give them a quick purge with croton oil,saline,elaterium or calomel. In full blooded patients you may bleed them to reduce the pressure. Do not blister as it leaves an open wound which may become infected. Treat the pneumonia if present as always. We ought to trephine in mennengeal hemorrhages if it can be localized esprcially in dural hemorrhages. For the high blood pressure give nitro glycerine 1/100 grain tid. For the syphilis if present give KI and Hg. Give KI anyway 10 - 30 grs. If he is restless give KBr 20 grs. or hloral hydrate 10 grs. If he is week in 2 - 3 weeks try galvanism to the nerves faradism to the muscles once or twice a day. Massage once a day for the sane reason. Tend to the patients back and prevent bed soars. Look out for cystitis,etc. Keep the patient clean and give him strychnine until he improves,

NUROSES

	1. Neurosthenia.
	2. Migrain.
Neurosis	3. Epilepsy. Epilepsy.
	4. Chorea. Chorea.
	5. ETC.

Neurotic means ,pertaining to the nerves. It is a functional disease not an organid disease of the nervous system. Many of these neurosis (neurotic diseases) are transfered to the organic class because by the improved methods of investigation lesions can be now discovered.Neurosis embraces the whole class under which neurestheria is a subhead.

CHOREA:- It is also called St.Vitus dance;x also myoclonia which is due to an infection,here we have an intermittent spasm or twitching of the muscles,in counterdistinction to myotonia where there is an persistant spasm of the muscles.Tetanus is zn example of myotonia. Chorea is myoclonia and is believed to be an infection. We speak of Sydenham's chorea or chorea minor in distinction to Huntington's chorea which is heriditary and which often leads to insanity. Sydenham's chorea is ordinary St.Vitus dance.

Chorea is quite frequent and about 20% of the nervous conditions in choldren are chorea. It is usually sud acute and is characterised by irregular,incoordinate,jerky movements of the voluntary muscles. It may be assot iated with(gout) rheumatism,endocarditis,mental disorders and many think it a stage of rheumatism.

Etiology:-It usually occurs in children between the ages of 5 - 15 but it may appear under 5 years of age and also in young people and adults. Sometimes it occurs in old people when it is called senile chorea or chorea senilis.It is very frequent in girls more so than in boys in the proprtion of 3-1;this proportion however,does not hold in adult life. It occurs in all climates and is more likely to appear in the spring then the autumn,summer and winter. It is more frequent in the cities. These cases are not always hereditary and they may be indirectly hereditary. Usually in these cases one or both of the parent have some nervous disease or they may have gout, rheumatism,tbc.,morphenism or alcoholism or insanity. High strung children which learn fast in school and over study are apt to have chorea. Exciting causes such as cycical disturbances,emotion,greef,wild paryoxisms of joy, great fright and worry. Insanity is caused by prolonged worry while chorea is brought on by more sudden emotional disturbances. Injury,rheumatism 25-75%,endocarditis without rheumatism may be assotiated with chorea. The soci al position of the patiet should be inquired into. Chorea is rare in the negro and absent in the aborriginal Indian;therefor look for this condition in people of higher life. The first shock of pregnancy in primipara may cause it. It follows infections like measles,typhoid,diphtheria,syphilis, pyemia,scarlet fever and whooping cough. Some cases are counted as being reflex disturbances as from the nose,stomach intestines (worms). Sexual disorders of an indefinite kind are contributed to chorea. Malaria is said to cause chorea but it probably does not. Dr. Graves says that he has nevr seen a case of chorea due to malaria directly. The anemia and run down condition of the patient following an attack of malaria may predispose the patiet to chorea. A cough,yawn or other cycical efects,(immitative children) may bring on chorea. Certain poisons as CO_2,opium,iodoform,etc. are menticned as causes.

Pathology:- There is no definite pathological lesion which characterises chorea. In the acut cases there is conjestion of the cerebral cortex,the membranes,basal gagnglia,paramidal tracts and spinal chord. The blood vessles are full and distended;little hemorrhages occur and necro tic foci occur which at times are followed by embolxi. There is a round cell infiltration of the perivascular lymph spaces and a swelling and proliferation of the intema of the arteries which may become occluded. In the chronic cases the conective tissue is increased in the xxxxx walls and the perivascular lymph spaces are dilated which indicates that it is a low grade ~~inflamation~~ infection. Osler calls atention to the fibrinous deposits on the heart walls.. Hyperemia occurs in other places of the brain than in the motor area although the effects on the motor area produce the results such as altered irritability and transmition of the nerves. It is belived that the incoordinate movement are due to the involvement of the lenticular nucleus. Where there is great cerebral conjestion the chorea may be severe and mania may result. Small hemorrhages occur,exudates,softning and even hemaplegia may follow. According to Dr.Osler,

85% have endocarditis.
26% have pericarditis.
90% combined heart lesions
12% have pneumonia. Some have plurisy,pyemia,plebitis,etc.

Symptoms:- In some the symptoms come on suddenly on others more slowly as is shown by the restlessness,irritability,perversity of disposition or marked or moderate uncontrolability of the child. In 1 - 2 weeks the symptoms become more pronounced;there are irregular twitchings of the arms,face and these movements are limited to one side usually. The child winks, grimaces,drops things repeatedly,etc. Later the legs become involved,

when the child stumbles. In 2 - 3 weeks the symptoms become still more pronounced and the other side is involved,however,rarely as much as the first. Later the movements may become continous and the child can't walk, dress itself,carry food to the mouth,comb its hair,swollowing is difficult and there is a loss of coordination of movements;speech may become confused and the resperation jerky. The movements may occur while the patient is at rest or motion. Motion may increase or decrease the choreac movements. The movements may be increased,decreased or absent while the patient is at rest;they usually stop during rest. The movements may cause insomnia followed by maniacal excitement and usually assotiated with hallucinations.

The incoordinate movements first occur in one set or group of muscles as those of the eye,arm,fingers or foot.They are all assotiated with muscular weakness not paralysis. The appetite gets poor and irregular; the patient becobes constipated and tongue is coted.Later the child becomes anemic. Excitement,fright or worry makes the movement worse. They are oftan worse ~~at~~ ~~an~~ in the morning bot are better in the afternoon,like a case of melancholia. The symptoms are largely motor and the sensory symptoms are no not well dofined and there is no pain but the violent jerking of the muscles may cause discomford. They do have paresthesias,numbness and tinglihg. Pressure symptoms may be present and cause headach but they never complain of anesthesia. The reflexes espedially the knee reflex are deminished and lost at times. Electrical responses are increased. There are no trophic disturbances but they may wet the bed at night. The urine is increased in quantity and there is an increased amount of PO_4,urea and the Sp.Gr. is increased.

Diagnosis:- You may have to diagnose it in any form as in the mild or manical. The maniacal for occurs more often at night,is more froquent in females an a history of previous chorea may help you out.

Paralytic Chorea:- In this form one arm,leg or side of the body is paralyzed.

Senile form:-In these patients the chorea occurs or comes on with a fair degre of suddenness. It occurs more often in old women.

The most important feature about the diagnosis is the irregular muscular contractions (voluntary) and they are confined to one group of muscles. Dont confuse these movements with athetoid movements in the hands which are slow flexion and oxtension of the fingers.

Differentiate:- Simple tremors in alcoholics,Hg.poisoning,Pb.poison or senile cases..

Athetosis from any ~~any~~ cause.

Paralysis agitans in adults. Here the tremor is also slow and occurs when the patient is at rest and stops when he begins to move. There is a regidity of the spinal column and a tendancy toward falling when he gets up to walk. At firs he moves slowly gradually his steps become faster.

Organic brain lesions which are assotiated with choreaform movements. This is seen in cerebral hemorrhage,tumor softning etc. Meningitis may be assotiated with choreaform movements.

Tbc. may cause choraform movements.

Multiple sclerosis can be confounded especially in children but here you have nystagmas,exaggerated reflexes and the tremor is a voluntary one.

Fredrich's Ataxia:- Here the reflexes are absent and it occurs in earlly life. You have ataxia.

Huntington's chorea :- Heredity plays a role in these cases going back for 3 -4 generations and there is assotiated nearly always mental decay and it occurs in adults.

PROGNOSIS:- The most of them get wel in 2 - 3 weeks except those which go into the manical or chronic form. If they don't get well in 6 monthe they are called chronic cases. Many have relapses and remissions especially girls and those cases which occur in thd spring. In a case of straight chorea you can nearly always assure the patient that he will get well.

TREATMENT:- In the bad cases put the patient to bed. At times it is only necessary to keep the patient in bed in the morning. In the afternoon they should get out into the fresh air. Remove all excitement. It is a ques of hygiene and food. A cold bath (shower) every morning is good or they may take a cold sponge bath up and down the spine. Alcohol,heavy diet,meat

and coffee must be cut out.. As most of these patients are anemic give them As to tolerance when they get puffy around the eyes,heaviness about the head,etc. when you can change off and give them FeCl3 or Blaud's pills for a while;then go back to the As. If they can't sleep at night give them 5 - 10 grs.KBr or chloral 1 - 5 grs.,this will quiet their nerves. A warm bath may be given. Antipyrin,acetanilid,sodium salicylate,aspirin ½ - 10 grs. may be given Also Tr.~~Semi~~Cimicifuga 1 - 2 drms., 1 - 3 times a day. Bromides and t the valarinate of Zn. is good in some cases. Hyocine bromide is good for children but can also be given to older ones 1/200 - 1/100 grs. 1/50 gr. physostigma often gives releif. Galvanic electricity applied to the spine for 10 - 15 minuits a day may do good perhaps through its cycical effect. If there is broken compensation you can give the ordinary remidies;strychnine and digitalis and strophantus in the ordinary doses.

H Y S T E R I A

Hysteria is a functional disease of the nervous system. It comes under the class of neurosis. It is chronic. It is characterized by by emotional disturbances and a lowering of the will powers and a derangement of the cerebral and spinal centers. By many it is regarded as a psychosis(a mantal disturbance bot merely nervous),beliving that it is due to a cortical disease of the brain not as yet understood.

It is marked by paroxysms and interparoxysmal periods,accompanied by more or less definite symptoms. The paroxysms are known as crysis. In the interparoxysmal periods we observe stigma and the hysterical tempeament.The hysterical temperment is quite prevelant especially in women but is not rare in men.

ETIOLOGY:- Heredity is very important. 75% of the neuropaths present this disease;the father may be an alcoholic while the child will be hysterical. ~~The~~ Or one of the parent may have epilepsy,migrane or be an alcoholic these conditions functionating in the offspring as hysteria.

Age:- It usually occurs during early adult life but has been known to occur in childreh under 4 years and in women after the climax. Men who have this disease are apt to be hyperchondrical,alcoholic,masturbate or have an adherant prepuse. In women there are usually assotiated sexual disorders or pelvic disorders and the most of them are prostitutes. Hysteria is ~~mos~~ of the civalized races. It occurs in the extremes of society being ~~m~~ more frequent in those who overindulge or in the poor. It is more frequent among the French,Hebreqs and Italians,less frequent among the English and Germans Negrows also have the disease but rarely. Aborigines show little evidence of the disease as they live in the open air and are physicaly stronger. Sedentary life and worry predispose the race to this disease. Infections as syphilis and that producing hemorrhage,tobaco,alcohol;poisons such as Pb. and Hg.. Traumatism is an important field especially in medico-legal cases; traumatic hysteria and neursthenia are some of the terms used to designate the condition in medico-legal cases. The higher the form os civilization the more sympathetic or immitative the character and the more frequent the hysteria;the savage is not liable to have hysteria. Sexual excess or excesses of any kind which distroy or lower the vitality. Pronounced emotional disturbances due to fright,fear,anger,excitement,sorrow,worry,etc. Insanity is due to prolong shock while hysteria is produced by sudden shock due to any of the above causes.

Pathology:- It is not known;but the pathology of the assotiated conditions is.

SYMPTOMS:- We have three clases of hysteria,vs:

1.-Hysteria Minor.
2.-Hysteria Major.
3.-Interparoxysmal manifestations or temperament.

HYSTERIA MINOR:-

This is the kind of hysteria we see in this country,the other forms are rare but are sure to come. In the patients which have hysteria minor you will find emotional weakness manifest at times;general nervousnes hyperesthesiaswhich perhaps are mental hyperasthesias;pain. They react and respond rapidly to ordinary stimuli of life. They don't have anesthesias or paralysis or convulsions as in hysteria major. Usually you see a young wom she is easily excited,depressed,nervous,impulsive,laughs or cries aparently without cause. She may have pains as in the spines or headachs (vertex), vertical;if it is confined to one spot it is called hysterical clavus; or

it may be in the region of the ociput (ocipital) or in the nape of the neck They are often poor sleepers. Some hav0 globus hystericus a paresthesia of the throat when there is a sense of choaking or clumping in the throat. Many have sovere chills. Some have tremors. They may flush easily.They may complai of cold extremities;their feet may de cold while the face is flushed;or they may have a subjective temperature due to a vaso motor disturbance. Some have vometing and excitement. Others pass into delirum or into trans like states while others do outomatic actions. You find the disease scattered throughout society and also in the insane. Many of the attacks are followed by the passage of a large quantity of pale colored urine;its Sp.Gr. is low. It may or may not be assotiated with nuresthenia. They have pyperasthesia which is of a cycical element. Some pave disponea which may become marked.(look out for your mother-in-law)

HHSTERIA MAJOR:- Between the paroxysms of hysteria major we have anesthesia,tremors,contractures and great emotional disturbance called hysteroepilepsy. It is not true epilepsy but its attacks are like hysteria (epileptoid hysteria). It may come on suddenly from trauma or shock and may be assotiated with convulsions and paralysis. There may be emotional spasms at first. In this condition we have spasms or crysis. There may be marked anger axcitement,convulsions,paralysis,hemiplegia,at times hemiplegia or monoplegia. There may be attacks of pain,gastralgia,vomiting,barking dry emotional cough,attacks of hiccough or sneezing. These go into cataleptic stages or transes. These transes often come on people during religious meetings. They may be forgetfull(amnesia). Large amounts of urine may be passed unvoluntarity during the attack.

Motor Symptoms:- They may vary from simple convulsions due to excitement or trauma to the severe forms where the patient falls down,has irregular thrashing contractures of the arms and legs and osilating movements of the head. Some may bite and scratch. In the worst type of this disease the legs are distended rigidly and the arms and hands and fingers are flexed. The eyes are closed and the pupils are dilated. They may produce inarticulate srying noise. Involuntarily they take care not to hurt themselves when they fall. They amy bite their lips but not their tongue. They will not bump their head on a sharp corner when they fall;all this is purely emotional. The attacks may last a few minuits to an hour or more. They have opisthotonos. They may fall down in a stupor and remain so for hours. Children often do this (mimicry of childrin). The attacks can often be stoped by producing pressure in the hystero-genetic ~~centre~~ zones;over the overies,under the mamae,eprgastrium, cervix or spine:in men by producing pressure on the testis,spine,etc.. Pronounced pressure will often abort the attacks while light pressure may bring them on. Tell they with a stirn voice that they will get better. The mental horizon of those patients is very small;you might say they have mental ataxia as the impulses are not coordinate. After the convulsions they may have paralysis. Between the crisis in the interparoxysmal spaces they show a hysteric temperament;otherwise they will remain normal.

Sensory Symptoms:- Hyperasthesia and anesthesia of the skin and mucous membrane and special senses. Paresthesias spoken of above. Usually there is hemi anesthesia taking in exactly one half of the body;most frequently on the left side but it may be disseminated all over the body,in scattered patches or spinal segments (segmented sanesthesia).The tactile and thermal senses are not impared and you have a resemblance to syringomyelia. You have pain pain,however. The temperature may eb lowered 3 - 4° on the affected side. ~~Bell~~ lood will not run from a pin prick. Many of these cases are called autohypnotic and are looken on as living wonders.. These areas may regain sensation by putting on a coin or applying the electric brush but you must impress them that this will cure them. The skin reflexes are lost. Retinal anesthesia may be present with concentric lesions of the visual and color ~~center~~ field; or they may go blind. Amblyopia may occur. The sight of one eye may be lost while that of the other will be ~~preserved~~ perverted. In suspicious cases get an oculist to examine the eyes for hysterical symptoms. There may be perversion or loss of the sense of hering. They may have paralysis of the acustic nerve. There may be a perversion of notes;they may loose the high and the lo notes. Taste is perverted and the sense of taste limited.xn The sense of sme

is simmilarly affected. Neuralgias are not usually marked but may be manifest in sick headach,intercostal ar facial neuralgia.. There may also be pains in the spine,heart and palpitation. Tremor,irregular movements and contractions are assotiated with weakness (myosthenia). The tremors are variable and may be of any kind but are usually slow,5-8 per second and are usually absent during sleep. The tremors usually occur in the hands,legs,face and tongue. They may be paraplegic or hemiplegic. Do not mistake them for intentional tremors or those simmilar to the tremors of multiple sclerosis. You may have a slow tremor while the patient is at rest while there is no tremor while the patient is awake or moving about.. Or the tremor may be fine one like that of a neurestheniс,alcoholic or like one present in exopthalmic goiter. The contractures may be temporary. They may occur after slight injuries. They occur in the legs,arms,muscles of the face. The paralysis and anesthesia is assotiated with the flexures or contractures..Keep in mind the following outline:

Neurosis	1. Hysteria.	Neuros psychosis or psycho neurosis	1. Hysteria.
	2. Neuresthonia.		2. Neurestheniа
	3. Epilepsy		3. Epilepsy.
	4. Chorea.		4. Psychosthenia
	5. Migrain,		Phrenasthenia.
	6. Etc.		
Psychosis	1. Hypochondria		
	2. Melancholia.		
	3. Etc.		

In the diagnosis I told you that some hold that hysteria is a psy co neurosis and not only a functional disorder. Neurosis is placed under the same hend for the same reason also epilepsy and neurestheniа;because of their multiple as well as their many similar manifestations:the deviding line between them being very,very narrow. In hysteria there is lacking a normal mental ity and really is a light grade psychosis.

Psychic symptoms of hysteria:- They may be due to to inhibition of the will power or the nerve current is weakened and the impulse not transmitted or there may be a defect in the cortex of the brain.. You must try to overcom this inhebition or stimulate the center and make them get better. These people want you to sympathise with them and they will go to any extreme to obtain this,such as falling down,getting convulsions,foaming at the mouth,etc. they like to be in the line light. They also have aboulia (weakness of the wi will). The lack of will power or lack of enervation was seen in the negro at thexr nerve clinis who could not put out his tongur or take a long stride when told to do so. There was no lack of muscular strength,paralysis or lack of blood suply to his tongue. There is an entire lack of controle. They go to pieces without apparent cause or reason. They can't controle or avoid thes actions. They may have variations between the ---emotions or rapid ossilations;thay will cry one minuit and laugh the next;shout for joy one minuit and weep the nekt. They are self decietful,vain,introspective,unstable(variations with or without cause,they become sugestable and auto-sugestiveand are easily hypnotize. They run every gamut of human emotion.

Physical symptoms:- Constipation,indigestion,pains,loss of appitito, regurgitations of food and gas;the regurgitation of gas may last for hours or days,vomiting,ematiation. The urine is pale,low Sp.Gr. or it may be deminished in quantity. A large amount of urine after a spell is sugestive of hyst eria

Vaso motor symptoms:- Flushing pallor,coldness,edema which may be waxy or a bluish edema of the extremities but more frequent in the legs and feet. There is a more or less irregular fever and anemia. In hystero epilepsy they fall uncontious,have convulsions both tonid and clonic in varing degree They become comatosed have opisthotomus or irregular incoordinate movements of the legs and armes.

The emotional stage of hystero epilepsy lasts longer,5-15 minuits. The change their position,go into delerium or may go to sneezing or have aviolen persisting hiccough;dysponea 50-100 resperations per minuit;disphagia;cough which is of a peculiar brassy,horse character or it may be like an anurism cough.

Diagnosis:- Tis is made on the signs and symptoms given;the history of the patient,his emotional character,hysterical temperament,previoue hysterical seizures and the variable character of the emotions without just cau

Differentiate:- 1. Cerebro spinal diseases discribed in the clinic with which hysteria may be assotiated.

2. Epilepsy (genuine). 3. Hysteria assotiated with other organic dif ;therefor look out for them and don't be to quick in making your diagnosis of simple hysteria.

Prognosis:- It is good in children and in those who are otherwise healthy and strong and in whome the attacks are not frequent and light. In the bad cases the prognosis is variable and they usually have the denease as long as they live. The traumatic cases are bad,also those due to pelvic trouble

Treatment:- Isolate those hysterical patients and get them away from those who sympathise with them. Sometimes it is wise and sometimes it is n not wise for you to tell them that they have hysteria;some dont like the w word and get offended. Get these patients occupied in some way. Cause a ch ange in their morbid thoughts especially those who are interested in them- selves;get they interested in some one else. Diversions of any kind may help;many are so interested in themselves. Remove the cause if possible as malaria,overindulgence of any kind. In the case of an over affectionate husband or wive,talk to them and change the condition,. The rest cure is not as good as was once thought although it is good in some cases,what they want is a new deal and a change of scene. You must put them under firm cont role,look after their hygiene. In those who need the rest cure you may keep them in beed in the morning and let them out in the afternoon for a drive, etc. Adjust the patient to the circumstances and make use of psychic means. Hydrotherapy is only good at times especially if the patient cant sleep. They may take a cold shower bath or a cold duchh,sea bathing,etc. Electric- ity,both kinds may releave the pains and also have the desired psychic eff- ect desired and if you add to this your sugestions as to the results you epect you may do much good. The idea is to impress them and make them belie ve that your treatment will cure they. Some do best if let alone. Be sure that you are correct in your diagnosis and then treat accordingly. Also addopt measures to prevent further attacks.

NEURESTHENIA:-

It is more common than hysteria. It is also called nervous prostratio fatigue,neurosis and Beard's disease in this country.

Etiology:- It is disease of civilisation. The more highly organized the form of civilization and society and organism the greater is the tendancy toward this disease. It is more frequent during the productive period of life when the people ought to be accomplishing the most;20-50 yea It is more frequent in females. All races are subject to it. The Hebrews, French and Italians are the more prone people. It is not so frequent in England or Germany. Neuropathic individuals and neuropathic heredity of any kind play a causal role. In the hereditary type it may have been,gout,tbc., rheumatism,alcoholism,malaria,syphilis,migrane,etc.. Much is due to our present school methods (constant overstrain,work and craming. Worry is not so important but if they work hard and also worry much it may be considered. These patient react intensely to every stimulous. Poisons such as infections alcohol,tobacco and auto intoxication may produce it or keep it up. Const- ant eye strain,~~angi~~,anxiety,probably masturbation,sexual abstainance,pelv- ic disorders in both sexes,may cause it. Traumatisms,accidents as R.R. or elevator,fright,terror,exaustion,may cause it. Physical illness as typhoid,Bright's disease,diabetis,tbc.,influenza,etc.. It occurs more freque nt in the temperate climates,tropics and in the cities. It used to be rare in the country but no longer so.

Pathology:- It is not definite.We discribe a functional nervous disease. It is a neutritional disorder and I have previously called your attention to the fatigue and over eating especially of the diet is rich in protids which is said to produce a chemical outo in toxication which in turne produces the fatigue,lassitude,inactivity,etc. This may be overcome by masticating the food more thuroughly and if ths is done they will probably also eat less. In neuresthenia we also probably have an unstable nerve cell which easily influensed and therefor becomes an easy prey to intoxication and metabolic disturbances which influence its neutrition. It is a quantitave rather than a qualitative neutrition..

SYMPTOMS:- Motor:* May of the symptoms are subjective. Muscular weakness and enertia is probably one of the worst ones;they can't sustain prolonged work. On rising they feel alright but soon play out but the weakness wears off in the afternoon when they again feel better. If there is prolonged effort there developes a tremor and twitching. The reflexes are exaggerated. The tremor is more apt to occur in the morning.

Sonsory Symptoms:- There are no anesthesias. If he has anesthesea he probably also has something else. The muscles fatigue easily. He easily gets headach following excitement,exertion,emotion,etc. It may be like a lead cap on his head or like a band around his head or it may be of an indefinite uneasy,heavy sense of fulness about the head. The mental process do not go on satisfactory. He may have backach,especially across the small of the back. Many of the symptoms are due to gastro-intestinal disturbances which are nearly always present. Paresthesia in the head and abdomen;fluttering, sense of weight,general discomfort,crawling and gnawing sensations. In the thorax there may be in addition to thse signs,difficulty of getting the breath,oppresion,shortness of breath which however is not true dysponea but only a dysponeac sensation. Many feel as though the is an impending calamity which they can not explain. Paresthesias in the sexual domain are present.

Eye Symptoms:- There is a running together of the letters and a blurring of vision. Discomfort and itching of the eyes,they feel uneasy. Thse conditions may cause headach and vertigo. There may be photophobia,thay cant stand the light and try to keep it out of the room by drawing the curtains. The pupils may be very mobile,easily dilating and contracting;this symptom is not always presient.

Hering:- Here there is difficulty sometimes tenitis is present. There may be a throbing and roring in the ears.

Smell and Taste:- They may be perverted,

Gastro-Intestinal Disturbances:- These are quite common. These people have nervous indijestion. Their appitite may be good today and poor tomorrow. There may be eructations,bad taste,discomfort,nausia,vometing,hear burn,constipation,atony of the bowel,dorrhea,fermentation,some go on into nervous muscus enteritis.

Circulatory Symptoms:- There may be palpitation,pain,discomfort,throbing flushing of the face; Often you will see these patients counting their pulse. The pulse is small,rapid at times especiall after excitement when it may go all the way from 90 - 150;the greater the excitement the faster the pulse. These patient do not often have murmars but they may have due to the nervous disturbance. It gets better or goes away in a few days. The murmar is often only present or caused during or by the the examination. These patients are apt to have cold extremities and often can't go to sleep for the coldness of their hands and feet.

Secretions:- The urine is usually deminished probably because these patients drink very little water. The urine is highly pigmented and they may have an irritable bladder. Deposits of urates and PO_4 may occur often leading the patient to believe that he has kidney disease. The secretions are nearly all deminished,however,at times there may be profuse sweating. There is often a paroxysmal increase in the amount of indican. There may be albinurea and glycosuria.

Genital System:- Sexual capasity is deminished in nearly all cases but there may be rapid and frequent erections and irritable,hurried emmis ions. Many of these patients masturbate. They often suffer from nurotic dreams with emissions.

The symptoms of nuresthenia take on almost any ~~u~~form of sensation as cold, heat,tingling,deadness,crawling sensations on the limbs and body,etc.

Psychic Symptoms:- These are usually quite marked and are also marked by weakness. Some are depressed during the paroxysms. They can't concentrate their mind. Their memory fails them. When fresh they can remember and memorize fairly well. Conception is narrowed and lacks precision,indagation will prove this. They are introspective and study their own troubles and think about them as about their headach,dorrhea,etc. You may not be able to get their off from themselves,if you succeed they come right back again. Then we get sensitiveness and psychosthenias. They get vasilating indicisivc or they may not be satisfied with they say or write and make repeated attempts at the same thing. They may have obsessions which are not really delusions but false conseptions. A neuresthenic thinks everybody is unfriendly to him and don't gave them the attention which they think that they ought to receive. Some go further;they wash their hands every few minuite,etc. and think that they are not cleanly enough about themselves. They also suffer in their effections,become irritable,pevish,faultfinding and nothing will suit them. They may be emotional and cry without apparent cause. These patients are often troubled with insomnia and think that they are not getting enough sleep although they are sleeping 8 - 9 hours a night. They don't feel rested They often wake up during the night and can't go back to sleep;or they always wake up at the same time in the morning no matter at what time they went to bed. They may be troubled with dreams. The thing to do with these patients is to make them believe that they sleep intensely and that they are getting plenty of sleep. Some of the patients are anemic and ematiated.

Neuresthenia is either aquired (from some illness) or primary. There are many kinds of neuresthenias as cerebral,~~s~~spinal,sexual,etc.,but this ~~xxxx~~ devision will not be followed. It is largely a cortical disease.

DIAGNOSIS:- It is to be differentiated from hyperchondriasis which now,however is classed as a psychosis. Remember that there are also hyperchondrical forms of neuresthenia,they,however,lack the numerous symptoms of neuresthenia. Mild forms of melancholia may be mistaken for it. Hysteria. It is often assotiated with neuresthenia in addition to an emotional disturbance,you mat have both. The neuresthenic can always tell you about ~~mx~~ himselfe and hase a clesr mind. They fear to hear bad news and for that reason fail to returne to your office after you have examined them for fear that you are going to give them a bad prognosis. Early stages of paresthesia are often hard to differentiate and it is not infrequently treated for neuresthenia and the diagnosis is hard to make.You get pupilary disturbances and irregularity,slugishness,slight tendancy toward pupilary contraction. They may also be introspective and overworked. Always look for these symptoms as on they depends your diagnosis. Simulation:- in addition to these cases we have cases of traumatic origin as from R.R.accidents. They simulate neuresthenia in the symptoms which they present but they have no organic lesion.

PROGNOSIS:- It is quite good but it dependes largely on the environments The traumatic forms are hard to cure especially those who stay at home and are treated there. Therefor break the chain of morbid environment. It is however,a tedious process and require from 6mo.- to 6 years,more or less. They may relaps but they will get well if they do what tou tell them. Many if they go off on a trip come back to soon.

TREATMENT:- ~~M~~ It is an important matter who the Dr. is and whoever he is he should deal singlehanded with these cases. He must gain their confidence. Don't forget that these patients are real sufferers and therefor examine each patient most carefull. The confidence and resultant influance which the Dr. obtains over his patient is as always a personal equation. Determine wether the condition is temporary or permanent. Remove the cause if possible Neuropathic individuals who are overworked and overworried should stop all this and to get their minds away from their work send them off on a trip in company with someone who knows how to entertain and interest them and mak them forget all about themselves and their business. Bad cases and those who are run down should be strictly isolated and ~~n~~ be put to bed and should be guarded by a good sensiable nurse,one who is not a neuresthenic herself.

The nurse should be tactful, jolly and healthy, one who eats and sleeps well one who functionates well in every respect. Place yhese patients back to sane living. It is not necessary to keep these patients in bed all day and you can let them out in the air for a while every day. Professional men often get neuresthenia as they are constantly concentrating their mind and thoughts. For this reason it is good to develope a hobby in these patients which will take them out in the air as, rowing, fishing, golfing, etc. Let them persue a milder occupation. Relax the mental and physical tension. These patients are almost constantly in a state of mental and physical regidity. Try to quiet their mind, let them laugh and grow fat. The diet is important in these patients. They should not eat to concentrated food. They should drink more water. Put them on a very light diet, chicken, milk, fish, oysters, e etc. Text-books say, don't x allow these patients any alcohol but many of them do very well on a glass of wine or beer but as a rule alcohol should b be cut out. Coffee and tea should be used in regulated quantities. Most of these patients do badly on a carbo hydrate diet as they nearly all suffer from distention and fermentation. As to climate; a change from a cold to a warm or from a moist to a warm climate often helps these patients. Some wil do well at sea level while others do better in the mountains.

Drugs:- Remember that these patients easily aquire the drug habit and having once startOd to use drugs they progressively call for larger doses. If you look carefully after the patients diet and climate you may not be called on to give many drugs. Eliminate the excitement and worry which are the usual causes of insomnia in these cases. For the sleepless ness you can give paraldyhide 1/2 to 1 dram. Dont repeat and drug to often, shange them about. You may give them trional or sulphonal in 10 - 30 gr. doses. If there is marked excitement give chloral-hydrate or bromides. Having given these drugs for a while, decrease the dose giving them inert substances in their stead and you will find that they sleep alright. A hot bath 95°- 98° will often put these patients to sleep. In some casesx a cold bath, shower or plunge will act the same way. Massage may put them to sleep. General galv-anism, from head to foot. A cold pack around the body may put them to sleep. If you want to give them a cold bath and they can't stand it , graduate them to it. For the pain and headach, make them quit their job, get them off the tension under which they are living; put on a hot water bag. In the way of drugs you can give aromatic Spt. of amonia 1 drm., asperin or phenacetine V - Xgrs.. Try massage of the head (send them to a barber and let them get a good shampoo. Some will require nerve tonics to keep them up. Strychnine may be given for this purpose but remember that some do badly on it. For the anemis give As. and Fe. For the atonia give bitters, quinine and HCl. For the constipation let them drink mineral waters especially before break-fast. You may also give them $MgSO_4$, cascara, atc., tyey should eat fruits as apples and prunes. Regulate the diet for the constipation.

Keep you patient boosted up. Remove the cause of the brain fag. Provide plesant perversions. Change the morbid mental concept. Do away with their distrusO. If you do this you will see them get well. You must always conv-ince them that there is no organic lesion if there is nod otherwise they will dot do so well

Acute Anterior Poliomyolitis: also called, Infantile spinal palsy, also Acute atrophic paralysis.

It is an organic disease of the spinal chord and is characterized by motor paralysis and motor paralysis and muscular atrophy. There are no sensory disturbances.

ETIOLOGY:- It is called infantile because it occurs so early in life, usually between the ages of 2 - 4. It is rare after 20 but may occur at any age. 80% of the cases occur under 3 years of age. It may be congonital. It occurs in boys and man prefforably. The most cases occur in the summer, from June to Sept., 75% - 80% of them. Only a small percent of the cases are congenital. Cold, exposure, over exersise and chilling are assigned as causes. Acute infections as measles 7%, etc. It may ossur in epidemics. Traumatism may be a cause.

SYMPTOMS:- It comes on suddenly. The patient may have a slight feve 100°- 101°. It may be preceeded, assotiated with or followed by vometing (cerebral vomiting, projectile). There may be delerium, convulsions at times a profuse diorrhea. Within a few hours to 24 hours to several days to a week a paralysis comes on. It is of rapid character and may involve 1,2 or all of the extremities. It remaines stationary for a while then the stage of in vasion begins and it lastes for 1 - 2 hrs. to a week. Then comes the stationary period which lasts for 2 - 8 weeks. Then comes the stage of improvement which lasts from 2 - 12 months. The chronic cases show a sudden invasion. They spend a restless night and wake up paralyzedand have a temperature of 100°- 102°. Some have pains in the limbs and back for a day or two. There is retention of the urine and feces at first but later this condition passes ofr. A strking symptom is the motor paralysis. It is usually a paraplegia. If four extremities are involved it is said to be quadraplegia, if one limb, monoplegia. The eye, larnyx and rewpiratory muscles escape nearly always in children. The ankles seem week and will not support the weight of the body. The limb is flaxid, the toes hang and the foot is draged while walking. It may become an encephalitixis and envolve the cerebral nuclea and is then called a polio encephalitis. When the nuclei of the eye muscles are involved it is called an polio encephalitis superior. If the lower nuclei are involved it is called inferior polioencephalit.. It reaches its hight in 2 -c3 days at times in one day. There is a wating and flaby condition of the muscles in 2 -3 weeks. The reflexes are gone. Occasionally there is tenderness along the nervos. In the stage of improvement the lirbs affected gradually get better. In 1/4% of the cases 2 legs are invblved; in 1/2% one leg. In the most of the cases the right leg is involved. The reactions of degeneration to the faradic current are decreased or lost. In the leg it is the anterior tibial group of muscles which are involved, sometimes the peronei muscles also; in the shoulder it is the deltoid. ~~They~~

They may reach the stationary period and remain so for a year. The bones stop growing, the fooot and leg remain small, turn a redish purple and are cold. Contraction set up when you get the various forms of talapes, the plantor facsia becomes contracted, the spine shows curvatures and the muscles of the effected limb show contractures. All this time the general health of the patient is good.

PATHOLOGH:- It is an acute exudative inflamation with tissue distruction. Dr. Graves thinks that it is an infection. There is no supuration. The anterior cornal cells of the lumbar and cervical enlargements especially are involved being distroyed and conective tissue takes their place. The sclerosis may spread to the latteral columns of the chord. There is an atrophy of the anterior nerve roots and motor nerves in tho severe cases.

DIAGNOSIS:- You must differentiate multiple neuritis. Here consider the clinical history, picture; its causes and its rarity in children. The early increased reflexes. Lack of history which would cause multiple neuritis and also that it is very rare in children. The swollen redish color of the skin, later the loss of reflexes. Remember that children who drink alchoholics may have the disease, i.e. multiple neuritis.

Next differentiate spinal meningitis or spinal hemorrhage. It may occur suddenly. Spinal meningitis may be an acute infection and you may find the dipplococcus in the spinal fluid. Instead of a flaxid form of paralysis you have spasticity and increased reflexes.

Cerebral palsy in children. This must be differentiated before the reflexes become exagerated. Here there may be hemi or monoplegia. Later there is spasticity and contractures and loss of reflexes due rather to the

degeneration spasticity of the muscles than to the degeneration of the nerves. By careful examination of the case and its history you will be able to make the diagnosis. You may have difficulty when the case comes on slow when it may simmilate muscular atrophy from which it must be differentiated. The diagnosis may also be difficult where the early reactions of degeneration are absent.

PROGNOSIS:- The most them,unless the ?nfection is very violent,get well with a defect of locomotion,rarely completely. Dont give to popeful a prognosis.

TREATMENT:- Rest from the staft and perfect quiatude. Put an ice bag to the spine. Some times a counter irritant as mustard or iodine will do good. If Bier's treatment is the thing the ice bag is contrindicated.. Give a mercury purge 1/2 - 2 grs. For the temperature give antipyrin, asporin or a cold spunge. For the pain,restloss ness and thretning convulsions give 10 grs.of KBr. Ergot can be give but is of no value. Lock after the kidneys and bladder and don't catherize to quickly try to get the patient to pass his urine by putting him into a hot bath. Keep the limbs affected warm with hot water bottles. Apply massage and electricity as coon as the acute infection has subsided. You can use elocricity every day or every other day. Use the faradic current to stimulate the muscles and later the galvanic current on the nerves and spinal chord. Massage is much the more important treatment. The patient should have the limbs keept warm. Prevent contractures by massage and cold bathes. Let the child up as soon as possible and put on splints or let it use crutches if necessary. For the reduced health give Tr of I,Q & S,cod liver oil,As or P. Keep them under treatment as long as necessary and don't let them out from your care to soon.

PARALYCIS AGITANS

It is a progressive disease,characterized by tremors,muscular regidit and weekness. There is a peculiar gate (festinating),peculiar attitude, sensory disturbances as heat,cold and restlessness.

ETIOLOGY:- Men are affected twice as often as women. The period of election is the fifth decade 50 - 60 years but it may occur earlier or late Those higher up in the scale of civilisation are more often affected than the poor and unhygienic.. Heredity directly or indirectly or their their equivalants are to blame in 15% of the cases. These equivilants are not always nervous diseases,they may be toxic or metabolic diseases. There may be circulatory disturbances,as,valvular diseases,arterio sclerosis,etc. There may be toxic conditions as rheumatism or diabetis. This is one of the diseases which is not attributed to alchoholism,syphilis,disipation or all around cussedness. It may be due to shock or traumatism,especially those who have a worring diathesis;thos anxious,disturbed,worring and hard working people are the ones usually affected.. The rheumatism is not always of an acute articular a type,it is more of a muscular charactor,sciatica and lumbago.

PATHOLOGY:- Its symptoms are well marked but the pathology of this disease is not well known. There are changes in the chord,medulla and espe ially in the medulla oblongata. There is conjestion of the blood vessles in the grey matter;the interstitial conective tissue is increased;the cell of the chord are atrophied and pigmented. The anterior cornual cells undergo the same changes as in the senile cases which causes some to look upon this disease as a pre senile disease. There secondary changes in the muscles. Some say that it is a toxemia affecting the nervous system and muscles due to a perversion of the secretions of the parathyroids,pituitary body or thyroid gland. This quite a reasonable theory.

SYMPTOMS:- Some of the patients have some acute illness succeede by pains in the arms and head. The disease nearly always begins with a tremor in the right hand. Some start with sciatica. They seem to be continous in an indefinite way about the pains in the arms and legs for a week or months. When the tremor sets in it starts in tyenfingers of the right hand,then it gradually goes up the and involves the whole arm. Next the right leg becomes involved simmilarly involved and finally the other side of the body. There is no tremor of the face or tongue untill late;this will help you in fifferentiating it fro paresis. After the tremor has been present for some time the patient notices stiffness and regidity in the arms hands leg back and neck. Then the tendions become shortened and the patien

stands bent over and cont straighten out very well and the legs are somewhat flexed;he hasa senile attitude. The gate is characteristic. He is slow in starting taking short,shuffling steps and he has difficulty in starting the movements. It is a gate of a festinating character. When he gets starte and the stimmuli accumulate and get under way the steps become faster and he cant stop or turn around well. They run forward and it looks as if they were going to fall. The speech is affected much like the gate. He can't start to talk well and the voice is weak,high pitched and piping. If he once gets started talking he cant stop very well and the longer he talks the faster he talkes. These patients have a sence of tire (tired feelig), which becomes intensified,aching,he gets restless and may go on the neuralgia. There is a flushing of the face and profuse sweating. The temperatur is normal but the skin seems hot dur to the flushing. The appetite and digestion is good. Don't confuse this disease with paralysis,it is not a paralysis but a muscular weekness and regidity. These patients fially bedom paralysed,week and helpless from spasticity and regity of the muscles. oss

The refloxes are normal or increased. They become bedriden and helpless.

The important characteristics of this disease are;

1st. Tremor;it is slow and coarse. The normal tremor is 10 - 12 per sec. but in this disease it is 4 - 6 per sec. It is a tromor which is prosent during rest and voluntary motion stops it. When the patient holds out his hand there is no tremor at first but it soon comes on. The tremor usually shows itself as slow movements of the fingers and thumb and they they tend to be approximated. There may be flexions or alternate flexions with pronation and supination at the rate of 4 - 6 per second.

2nd. Regidity. It may be the only symptom and occurs in the floxors of the body,arms legs and neck (retro collic position) and with it may be assotiated cramps. The stiffness causes the characteristic gate and instead of going forward he may back up or move to either side.

3rd. Muscular weakness which is assotiated regidity. It is an early symptom and it is progressive. There is no elecrical reaction of degeneration. The muscles of the face show these changes of muscular weaknoss leaving the face expressionless and masklike and there is a straight forward staring of the eyes. A tap on the muscles showes increased irritability For the same reasons the voice muscles are affected,the intrinsic muscles of the larynix being weekened. The hand writing shows the same thing, there is difficulty of starting and the letters get smaler and there is a loss of clearness and neatness and later shows an irregularity due to the tremor. The staring is always present but it can not be explained as the muscles of the eye are not involved and vision is not disturbed.

4th. Vaso motor disturbances. These are seen in the flushing of the face and sweets. They are constipated and they rapidly and progressively loose sexual instinct. Conjestion about the neck of the bladder with frequency of urination and polyuria. They have peculiar emotional attitudes,they laugh and cry easily and are easily aroused.