should and does stand in the position of higher authority that he deserves. He must always be called upon to pass judgment upon obscure questions that arise in great abundance from the routine work of the younger men. The man in active practice should be in touch with the group of recently trained workers, who should carry on routine examination of all his patients. He should also be in touch with a pathologist of established reputation to pass upon such questions as arise, when an opinion as to the significance of findings is necessary.

I speak from the point of view of a practitioner and not of a pathologist, and I leave it for those who follow to point out the details of cases, in which clinical pathology is important in actual practice. I would merely add, for the benefit of any general practitioner who may be still deep in the purely clinical rut, that the free use of clinical pathology will add new interest to his professional work.

THE PRESENT ATTITUDE OF BLOOD EXAMINATION FOR DIAGNOSTIC PURPOSES.*

BY FREDERIC E. SONDERN, M.D., NEW YORK.

THE evolution of hematology during the last decade has been so pronounced, that at the present time an accurate knowledge of the blood condition is considered essential in the diagnostic and prognostic conclusions in all but the most trivial cases. While an enumeration of the blood changes noted in the different diseases and an opinion concerning their significance are not possible in the time at my command, there are quite a number of pathological processes in which an examination of the blood is of much practical value to the clinician.

The present more intimate knowledge of the minute differences as well as of the relative changes noted in the various forms of anemia has unfortunately shed little or no light on the etiology of these diseases, but has greatly facilitated their diagnosis, as well as the differential diagnosis. Thus, simple anemia, secondary anemia, pernicious anemia, splenic anemia and Hodgkins' disease can be differentiated with greater precision than the former less accurate knowledge of the blood changes allowed.

In the different forms of acute and chronic leukemia, recent work has taught much and justifies dissatisfaction with the present clinical classification of these conditions. Acute lymphatic leukemia as well as the recently described acute myeloid form of the disease, present a clinical picture simulating an acute infectious process, and it is by means of the routine blood examination that the differential diagnosis is now most frequently made, improper surgical procedures prevented and the fatal prognosis learned at the earliest possible moment.

It is not only in the blood diseases proper, if they may be so termed, that the examination of

the blood is useful. In acute febrile conditions, when the clinical picture is not yet sufficiently pronounced to justify a diagnosis, a routine examination of the blood is often a guide and always a comfort. This examination shows the degree of anemia if any, and a search for plasmodia, a Widal test, an enumeration of leucocytes and a differential count of the latter, while they may not establish the diagnosis, they at least confine it within narrower limits and often exclude feared grave conditions.

The value of finding the characteristic organisms in malaria, filariasis, tripanosomiasis and relapsing fever needs mere mention. The increase in the relative number of large lymphocytes noted in malaria is an additional stimulus to repeated search if plasmodia are not found at once. In the event of coma, the knowledge that meningitis and brain abscess are always accompanied by a leucocytosis and relative polynuclear increase, that uremic, post-epileptic and diabetic coma sometimes show leucocytosis and that narcotic or alcoholic poisoning, hysteria and tumor have no accompanying leucocytosis, is also of diagnostic value when combined with the clinical observation.

The early stages of scarlet fever often present diagnostic difficulty; but when it is recalled that this disease always shows a pronounced leucocytosis and relative polynuclear increase, it is more readily distinguished from several other eruptive conditions most easily confused which do not present this characteristic.

In typhoid fever, we had hoped that the early diagnosis would have material aid from the Widal serum reaction. While this anticipation has been but partly fulfilled, owing to the delayed response to this test in many cases, the fact that uncomplicated typhoid shows no leucocytosis and a relative lymphocytosis on differential count of leucocytes is an aid not to be overlooked.

In pneumonia, a consideration of the blood picture is often of the greatest value in both diagnosis and prognosis. It has long been conceded that in central pneumonia and in other cases where the general symptoms are present but the physical signs are not characteristic or wanting, the existence of a pronounced leucocytosis often justifies the diagnosis. While scarlet fever or a suppurative process will present the same blood characteristics, the clinical aspect of the case seldom admits confusion on this account.

In the prognosis of pneumonia, it has long been known that the absence of a leucocytosis is a very grave and usually fatal sign. For several years not only the leucocyte count, but also the differential count of leucocytes in pneumonia have had my particular attention. I will not enumerate the details of these observations, but simply quote the conclusions they seem to justify.

The increase in the relative number of polynuclear cells is a direct indication of the severity of the toxic infection and the degree of leucocytosis an absolute indication of the body resistance toward the infection. In other words: (1) Slightly

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increased polynuclear percentage indicates slight toxic infection, irrespective of the leucocyte count. (2) Greatly increased polynuclear percentage indicates severe toxic infection, irrespective of the leucocyte count. (3) Slight leucocytosis with slight polynuclear increase indicates fair resistance and a slight toxic infection. (4) Pronounced leucocytosis with slight polynuclear increase indicates good resistance and a slight toxic infection. (5) Slight leucocytosis with pronounced polynuclear increase indicates poor resistance and a severe toxic infection. (6) Pronounced leucocytosis with pronounced polynuclear increase indicates good resistance and a severe toxic infection. (7) Absence of leucocytosis with pronounced polynuclear increase indicates no resistance and severe toxic infection; and a falling leucocytosis with a rising polynuclear percentage indicates diminishing resistance and increasing toxic infection. (8) Falling leucocytosis with a falling polynuclear percentage indicates diminishing toxic infection only, or recovery, in other words.

Blood serum reactions, agglutinations, Pfeiffer's phenomenon and similar work on which scientists are at present engaged are among the most important researches in medicine to-day, but the results are not yet sufficiently precise to find application here.

In surgery as in medicine, the examination of the blood has found application in diagnosis and prognosis.

The arbitrary rule, that no surgical procedure is to be undertaken when the percentage of hemoglobin is below thirty should no longer adorn our textbooks. Determination of the amount of hemoglobin in these specimens poor in coloring matter is a very crude matter, and opinions concerning any operation in cases of severe anemia are much better when based on a complete blood picture, than if a necessarily crude estimate of the amount of hemoglobin alone is considered. The chlorotic girl with 30% hemoglobin, 4,500,000 red cells, a normal leucocyte count and perhaps a slight relative lymphocytosis on differential count is certainly in much better condition to withstand an imperative operation than the case of secondary anemia, with 50% hemoglobin, but only 2,000,000 red corpuscles, a marked leucopenia and a high relative lymphocytosis.

Cryoscopy of the blood is a recognized method for determining the functional activity of the kidneys, and while some pelvic circulatory disturbances simulate the picture of impaired renal function, the method in conjunction with a proper urine analysis is decidedly useful.

Blood cultures as diagnostic and prognostic aids have also increased very much in value. Present knowledge seems to indicate that the former negative results can be ascribed to undue concentration and consequent bactericidal action of the shed blood. With proper technique and sufficient dilution in fluid media, the method is most useful, particularly in septic conditions. Its practical use demands expert technique and full bacteriological laboratory equipment.

The physiological changes in the blood due to pregnancy and parturition are somewhat better understood, so that findings due to complicating disorders are of more value than they were, though published observations are still meagre.

One of the most important spheres of usefulness of blood examination in surgery is its value as a guide to the existence and severity of an inflammatory process, to the presence or absence of a purulent exudate, and to the resistance offered by the economy toward the toxic infection. Continued observation bears out the opinion expressed before the Surgical Section of the Academy on Feb. 3, last, and I can but repeat the conclusions then voiced.

(1) A relative percentage of polynuclear cells below 70, with an inflammatory leucocytosis of any degree, excludes the presence of gangrene or pus at the time the blood examination is made, and usually indicates good body resistance toward the toxic infection.

(2) An increased relative percentage of polynuclear cells, with little or no inflammatory leucocytosis, is still an absolute indication of the inflammatory process and the percentage is a direct guide to the severity of the toxic infection. As above stated, in all the cases of which I have clinical record, no pus or gangrene was ever observed with a polynuclear percentage below 70. In children, where the polynuclear percentage is normally lower than in adults, I have seen pus or gangrene with the percentage as low as 73. In adults, a purulent exudate or a gangrenous process is decidedly uncommon with less than 80% of polynuclear cells and the probability of their presence increases with the percentage. Eighty-five per cent or over of polynuclear cells I have never seen without a purulent exudate or gangrenous process irrespective of the leucocyte count. Ninety per cent of polynuclear cells has always indicated a very severe degree of toxic infection and while I had one specimen of 95.2% where recovery followed operation, all other cases in which the percentage was over 94.5 resulted fatally. It is not wise, nor will I attempt to establish narrow arbitrary limits, but I am quoting the above figures from more than 1,400 surgical cases studied in this way.

This second type, of increased polynuclear percentage, with little or no inflammatory leucocytosis, is the most interesting one, as it particularly demonstrates the value of the procedure I am advocating, and the cases are usually in urgent need of operation on account of poor body resistance.

(3) An increased relative percentage of polynuclear cells with a decided inflammatory leucocytosis. Most of the cases of inflammatory lesions, with or without purulent exudate, meet the specifications of this class. Here, as in the last series, the percentage of polynuclear cells was found an accurate guide to the status of the inflammatory lesion, and the figures quoted above apply here as well.

The body resistance toward the infection is a most important point, and while the clinical

manifestations are usually a good guide, this is by no means invariable. Good resistance, marked leucocytosis; poor resistance, little or no leucocytosis, is the old rule. As stated, I believe the leucocytosis, with a given percentage of polynuclear cells, is the best indicator of the body resistance toward the toxic infection.

For example, a patient has an inflammatory lesion without purulent exudate and a polynuclear percentage of 75. If his leucocyte count is 25,000 the body resistance is much better than if the count is 10,000. Another case has an acute inflammation with abscess and a polynuclear percentage of 84. If the leucocyte count is 30,000 the body resistance is much better than if the count is 15,000. The severely toxic patient with 92% polynuclear cells is combating his disease with greater energy and success if he has 40,000 leucocytes in 1 cmm. than if they are only 20,000; and should the leucocyte count be 7,000, this is a clear indication of an absence of all systemic effort to overcome the infection. My records show many examples of the truth of the above assertion.

The value of iodophilia in estimating the character and severity of an inflammatory process is, I believe, quite secondary.

To prevent an accusation of undue reliance on any one aid, I will close with a good motto: "The man who makes every diagnosis in the laboratory is as short-sighted and liable to grave error as the man who ignores microscope and test tube."

LABORATORY AIDS IN THE DIAGNOSIS OF DISORDERS OF THE GASTRO-INTESTINAL TRACT.*

BY E. E. SMITH, M.D., PH.D., NEW YORK, N. Y.

I SHALL not attempt a systematic presentation of my subject this evening but, rather, content myself with a discussion of such isolated facts as seem to me of special interest.

If you are willing, we may extend the subject to include the entire digestive tract.

The laboratory examination that is most commonly of value in connection with the pharyngeal mucosa and the tonsils is the bacteriological examination of its exudates. A word of precaution is necessary in connection with the diagnosis of diphtheria. When the morphology is typical, the diagnosis from serum cultures is quite conclusive. Occasionally, however, it happens that the procedure is uncertain. Let me mention such an instance that occurred only recently. I was much puzzled that a throat which presented what seemed to be a diphtheritic ulceration showed, bacteriologically, only a bacillus not possessed of the typical morphology of the Klebs-Löffler. Although reported by me as negative, it was regarded by another bacteriologist as probably an atypical form of the diphtheria bacillus, while the municipal laboratory reported diphtheria without qualification,

though duplicate cultures were conflicting. Antitoxin was given with some subsequent improvement. Attention was finally directed to an eruption which had appeared before the administration of antitoxin. A consideration of the case along these lines established indisputably the diagnosis of the secondary stage of syphilis. The patient had but shortly before returned from Vienna and presented a clinical picture with syphilitic ulceration of the throat easily mistaken for a time for true diphtheria.

Fortunately, we have other aids to diagnosis in just such cases as this. I refer to the examination of smear preparations made directly from the ulcerated surface. At least two diseases are differentiated from true diphtheria by a competent examination of such material, namely, Vincent's angina by the recognition of the characteristic fusiform bacilli and syphilis by the recognition of the spirocheta pallada. It is yet too early to say with certainty that this last organism is the cause of syphilis but so far, at least, we seem to be deriving material aid from a knowledge of its presence. In connection with the mouth, let me remind you that the existence of gonorrheal stomatitis has been reported and that the gonococcus is demonstrable in the discharge of the ulcers.

The examination of the stomach contents, either vomited, obtained in gastric lavage or removed after a suitable test-meal, is of unquestionable value and should be more generally practised, especially in chronic gastric disease. There is one class of cases, however, which emphasizes the value of systematic examinations of patients, even though they may present pretty well localized symptoms. I refer to those cases of persistent vomiting due to a condition of acid-intoxication. For several years, this origin of the exciting cause of such attacks has been recognized in some cases of the persistent vomiting of childhood. At the present time evidence is accumulating to show that not infrequently it is the cause of persistent emesis in adults. The associated clinical manifestations in such cases may be varied but the occurrence of attacks of persistent vomiting lasting usually several days is constant. As an example, I may mention a case of melancholia with associated high tension and renal congestion. The first impulse was to attribute the vomiting to uremic intoxication, but examination of the urine showed the presence of acetone and diacetic acid, affording abundant evidence of acid-intoxication, due, in all probability, to inanition because of the mental state. In such cases the attacks may be prevented by a proper dietary and aborted by the heroic use of alkaline medication.

Riegel has emphasized the value of differentiating between the gastric conditions of hyperacidity, alimentary hypersecretion and continuous hypersecretion. The term "hyperacidity" is used to indicate hyperchlorhydria without hypersecretion, the term "alimentary hypersecretion" to indicate an increased flow of gastric juice as a result of digestive stimulation; and, finally, the term "continuous hypersecretion" to indicate a

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