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ERYTHROCYTE MORPHOLOGY and PHYSIOLOGY

THE INCORPORATION OF ALPHA-C14-ACETATE INTO THE STROMA OF THE ERYTHROCYTE.

The authors report that acetate is rapidly incorporated into the stroma of the erythrocyte and that there is a rapid turnover of the C14-labeled constituents of the stroma. This is interpreted to mean that, unlike the circulating red cell hemoglobin, the labeled stroma components are metabolically active and perhaps exchange with chemically identical plasma constituents. It is noted that the highest isotope concentrations in stroma were observed in a splenectomized rabbit, suggesting that the catabolic phase of stroma metabolism is altered.

These studies were carried out in connection with investigation of an anemia produced in the rabbit by ligation of the splenic and gastric coronary veins. — C. E. R.


The in vitro mechanical fragility of ten normal and ten thalassemic samples of blood was tested by shaking the blood with steel globules for 20 minutes in horizontal tubes in a Kahn shaker, specimens being removed periodically for red cell count and photometric determination of solubilized hemoglobin. The results indicate that thalassemic erythrocytes show decreased fragility to in vitro traumatization. — S. T. C.


Rabbit red blood cells were recovered after freezing in the presence of glycerol and storage at -79 C. for 2 hours, 20 days and 42 days. They were labeled in vitro with either 32P or Cr11. Samples were injected into the rabbit from which the blood had originally been taken and the radioactivity remaining in the circulating cells at intervals after injection was compared with that found after injection of unstored, unfrozen labeled cells.

With this method, it was possible to obtain information about survival of red cells for a few days only, but the results indicate that during this period the survival of the control and the previously frozen red cells was similar. — S. T. C.


This article is of general interest. It points out that cyanosis is not usually recognized until the arterial oxygen saturation values fall to about 75 per cent. Other interesting data are given concerning the relationship of reduced hemoglobin content to cyanosis. — T. R. T., Jr.
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"A detailed procedure is presented for the preparation of an alkali-modified human globin suitable for parenteral use in various clinical conditions. Erythrocytes, which are most often discarded after blood plasma processing, are utilized."—T.R.T., Jr.


Twenty patients with congenital cyanotic heart disease and 5 noncyanotic convalescent adults were studied with simultaneous direct measurements of plasma volume and whole blood volume combining the Evans Blue dye and radioactive phosphorus methods. The cyanotic patients in both childhood and adult groups were found to have diminished plasma volume, greatly increased red cell volume and elevated whole blood volume when compared with noncyanotic individuals.—C.E.R.


The work described in this report was done during the years 1937 to 1939, and involved analysis of 1,200 blood counts (hemoglobin, red cell count, hematocrit) done on 249 infants from birth to 13 months, in an attempt to establish normal values for healthy infants. These subjects were racially as “purely English” as could be obtained. Premature, immature and sick infants were excluded.

In no age group was there a statistical difference between the hemoglobin values in breast-fed, artificially-fed, and partly breast-fed infants; but there was a distinct, probably significant, trend, for the breast-fed group as a whole (i.e., taking all ages) to have the highest hemoglobin values of all infants. It was felt that breast feeding, which supplies more iron than cow’s milk, produces small but ultimately significant effects on the hemoglobin level. Even the lowest hemoglobin levels, however, were still within the normal range. Nor was there any difference in the red cell values or the hematocrit values in the variously-fed infants.

Detailed tables enumerate the normal average values for infants from birth to the age of 13 months.—S.E.

IRON, PORPHYRIN and HEMOGLOBIN METABOLISM


Radioiron was fed orally to a patient with hemochromatosis. Data are presented which indicate an increased absorption by this patient, most of which was stored in the liver. Certain aspects of the work are not described in detail, so that critical analysis is not possible, but in general the data appear to support the above statements.—T.R.T., Jr.

Porphyrin chromogens or precursors in urine, blood, bile, and feces. C. J. Watson, R. Pimenta de Mello, S. Schwartz, V. E. Hawkinson and I. Bossenmaier. From the Department of Medicine, University of Minnesota Hospital, Minneapolis, Minn. J. Lab. & Clin. Med. 37: 831–842, 1951.

Studies are presented which confirm the observations of Sailleit, in 1896, that coproporphyrin of human urine is excreted largely in the form of a colorless precursor, or chromogen.
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The amount of chromogen varies without relation to the isomer preponderance (I or III), and it is significant that in any given urine sample the isomer ratio is the same as that found for the preformed porphyrin.

In relatively fresh urine considerable amounts of coproporphyrin may be overlooked unless the new method of analysis is used, and details are given which permit an evaluation of this method.

In a study of 6 cases of intermittent acute porphyria and 1 each from the photosensitive and mixed types, there was found a chromogen for uro-type porphyrins, distinct from porphobilinogen, and which is Ehrlich negative.

Data are also presented for blood, bile and feces, and a discussion is given of the implications of the finding that the porphyrins are excreted in a colorless form not previously measured.

These studies are of great importance to all who are interested in this field.—T.R.T., Jr.

AN IMPROVED METHOD FOR THE DETERMINATION OF URINARY COPROPORPHYRIN AND AN EVALUATION OF FACTORS INFLUENCING THE ANALYSIS. S. Schwartz, L. Ziere and C. J. Watson. From the Department of Medicine, University of Minnesota and Veterans Administration Hospital, Minneapolis, Minn. J. Lab. & Clin. Med. 37: 843-859, 1951.

A fluorimetric method for the determination of coproporphyrin and coproporphyrin precursor (chromogen) is presented in detail. The paper is of major interest to those who are interested in the laboratory aspects of porphyrins, and is an excellent critical discussion of well planned experiments.—T.R.T., Jr.


"The method involves the titration of porphyrin with standard copper solutions by following the changes of optical density at selected wave lengths where the free porphyrin and copper porphyrin complex show greatest differences of absorption."—T.R.T., Jr.


In previous work the authors have noted an erythrocytosis, unaccompanied by a rise in hemoglobin, in rabbits given a single subcutaneous injection of 15 mg. of folic acid or 20 μg. of vitamin B₁₂. The interpretation of these findings is discussed. The explanation favored is that a redistribution of hemoglobin occurs between the old and the newly formed cells.—S.T.C.

ANEMIA


This report includes observations on 45 patients during the past seventeen years, 26 of whom were followed for periods of from one to fourteen years. The clinical features were essentially those previously described by these and other authors.

The response to therapy reported here further emphasizes the differences between megaloblastic anemia of pregnancy and Addisonian pernicious anemia. There was seldom, if ever, a response to parenteral liver extract or to vitamin B₁₂ in doses more than sufficient to produce a response in Addisonian pernicious anemia. This observation is contrary to the theory that megaloblastic anemia of pregnancy is due to a deficiency of the anti-pernicious anemia principle, brought about either by lack of extrinsic factor from the diet or by a temporary absence of intrinsic factor from the stomach. All 8 patients who received folic acid responded. Responses were also obtained to raw liver pulp and to yeast extract.
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The dietary histories were investigated in 27 cases; in only 11 of these could the anemia be explained or on a deficiency basis. The survival rate of transfused normal erythrocytes was followed in three cases and in each there was an increased rate of elimination.—C.E.R.


A series of 20 cases of severe hypochromic anemia seen in young soldiers over the course of two years at a military hospital is described. In none was any source of blood loss discovered nor any gross accompanying organic disease. The majority of patients showed a tendency to immaturity and some showed nail changes. Sixteen had hypo- or achlorhydria. They all responded rapidly to treatment with oral iron. The suggestion is made that the anemia was due to increased demand for iron associated with manufacture of myohemoglobin coupled with defective iron absorption.—S.T.C.

Hematology and Biopsy in Liver Disease. H. Ludin. From the Medical Dept. of the University Clinic of Basle, Switzerland. Helv. med. acta 17: 340–353, 1951.

The author gives an excellent survey on the hematologic findings in liver disease, especially concerning the macrocytosis which he considers as a sign of maturation disturbance of the bone marrow. In a second part he treats the question of liver puncture, allowing judgement to be made of the functional state of the liver tissue.—C.M.


In a large number of cases of chronic iron sensitive chloranemia a transitory marked increase of red cells takes place during the time of clinical improvement. However, the total hemoglobin, the hematoctrit and the color index do not rise above normal. The explanation is that with the start of regeneration a large number of red cells enter the circulation and mix with the older hemoglobin defective cells. Only when all the older erythrocytes are removed from the peripheral blood, are the normal values restored.—C.M.

Folic Acid and Vitamin $B_{12}$


The urinary excretion of folic acid following intravenous injections of 50 to 400 $\mu$g. of P.G.A. was studied in 10 normal subjects, 3 patients with steatorrhea, 5 patients with untreated and 13 patients with treated pernicious anemia.

In normal subjects there was no increase in excretion above the base line of 1 to 10 $\mu$g. per day with a dose of less than 200 $\mu$g. P.G.A. but an appreciable increase was always apparent with a 400 $\mu$g. dose. This increase, however, represented less than 10 per cent of the injected dose. The amount lost in the urine tended to rise with successive doses. Since urinary excretion had returned to the resting level within six hours of injection, this was unlikely to be due to delay in excretion after previous doses.

None of the patients studied excreted more of the injected dose than the normal subjects. The 3 patients with steatorrhea, 3 of those with untreated and 2 of those with treated pernicious anemia excreted less, and others failed to show a rising excretion with successive doses.

It is concluded, that there may be a rapid increased utilization of folic acid in some instances of megaloblastic anemia, but whether this is due to a real or conditioned deficiency of folic acid is not apparent.—S.T.C.

This paper is an attempt to throw light on the biologic interrelations of vitamins B12, folic acid and Leuconostoc citrovorum factor (LCF) by studying the LCF excretion of hyperthyroid rats under various experimental conditions.

The results indicated that either the rate or the extent of conversion of folic acid into LCF in the rat is controlled in some fashion by the activity of the thyroid. This was shown by the striking increase in LCF excretion above the basal values by animals receiving desiccated thyroid in various combinations with B12, folic acid, LCF and whole liver powder. The highest values were obtained in animals receiving thyroid plus Wilson’s whole liver powder. (The Wilson’s Liver Powder supplies folic acid, LCF, B12 and an unidentified antithyrotoxic factor.) Supplements of vitamin B12 or of LCF fed to rats not rendered hyperthyroid failed to increase LCF excretion.

The increased excretions of LCF in hyperthyroid rats following the administration of B12 is of particular interest.—C.E.R.


Single injections of 15 mg. folic acid, 20 μg. of vitamin B12 or 4 ml. of liver extract produced a considerable increase in the free erythrocyte protoporphyrin in rabbits, as in patients with Addisonian anemia responding to treatment. In rabbits depleted of reserves of glycine by previous injection of benzoic acid, no erythrocytosis or increase in the free erythrocyte protoporphyrin followed injection of B12 or folic acid. After administration of glycine to these animals the normal response was obtained.—S.T.C.


A method is described for the preparation of nontoxic extracts from feces which will provoke a hemopoietic response in patients with untreated pernicious anemia. Extracts were made from feces of 1 normal person and 3 patients with untreated pernicious anemia. The active substance in the feces appeared to be vitamin B12 and the amounts excreted appeared to be much the same in the normal and anemia subjects.—S.T.C.

BIOCHEMISTRY of LEUKOCYTES


Alkaline and acid phosphatase activities were determined in the leukocytes of patients with no disease, with leukocytosis and with myelocytic leukemia. There was high alkaline—normal acid phosphatase activity in leukocytosis, and low alkaline—normal to high acid phosphate levels in chronic myelocytic leukemia. These data did not overlap except for one patient. There were 30 patients with leukocytosis and 14 with chronic myelocytic leukemia.

The literature on the chemical constituency of leukocytes has been very well reviewed.—T.R.T., Jr.

Cytochemical Researches on the Lipids of the Hematic Cells with Particular Attention to Those of Acute Leukosis. E. Storti and S. Perugini. From the Institute of Medical Pathology, University of Pavia, Italy. Acta haemat. 5: 321-333, 1951.

With a special sudan black B Giemsa staining the authors investigated the distribution of lipid granula in human blood cells. The findings concerning infectious diseases and the
acute leukemia are of particular interest. The most immature cells of the hemocyto-myeloblastic type do not show any lipid granulas, whereas the more mature forms are definitely sudanophile. The findings often do not agree with the diagnosis made by the usual stain. The new technic gives interesting new viewpoints concerning the general morphology and the classification of the leukemias.—C.M.

LEUKEMIA

EXPERIMENTAL STUDIES ON THE ETIOLOGY OF HUMAN LEUKEMIAS. F. Magrassi, G. Leonardi, G. Negroni and A. Tolu. From the Department of Internal Medicine, University of Sassari, Italy. Acta haemat. 6: 38-50, 1951.

Experiments were performed in order to investigate a possible relation of human leukemias to a viral cause. The animals treated with human leukemic material exhibited a characteristic and severe disease with the following picture: reduction of blood cells, loss of hair, skin atrophy, extensive degenerative changes of glandular parenchymas and histiocytic proliferation in spleen and lymph nodes. According to the experimental results the authors assume a viral etiology of leukemia, an assumption at variance with that of many other investigators.—C.M.

CHRONIC MONOCYTIC LEUKEMIA. J. W. Beattie, R. M. E. Seal and K. V. Crowther. From the Cardiff Royal Infirmary and the Department of Pathology, Welsh National School of Medicine, Cardiff, Wales. Quart. J. Med. 20: 131-139, 1951.

Two cases of chronic monocytic leukemia are described, of fifteen months and three and a half years’ duration respectively. Autopsy findings are given for the latter case. Attention is drawn to the prolonged phase of anemia without clinical evidence of leukemia in both cases. In one case monocytosis was present without an increased white cell count.

The relationship between monocytic leukemia, Hodgkin’s disease and other lymphatic tumors is discussed as well as the origin of the monocyte and the status of monocytic leukemia.—C.E.R.


This is an interesting presentation of 4 cases of coexisting leukemia and pregnancy. Pregnancy has not been shown to alter the course of the leukemia. In the chronic forms of leukemia a study of the 110 cases reported in the literature reveals that 75 per cent of the babies are normal. Apparently death from uterine hemorrhage at delivery is very rare. A leukemic mother has not been known to give birth to a leukemic child. Leukemia in the mother seems a definite cause of premature birth of the offspring.—P.F.W.


This is an excellent summary of pertinent statistical data on incidence, distribution and duration of myeloblastic leukemia. Data on a total of 975 patients are compared. There appears to be an increasing incidence of leukemia from 1910 to 1948. During the same period there has been a progressive and consistent shift in the sex ratio toward a higher proportion of females. There has been an increase in the age of onset. There has been no significant change in duration of illness. The mean survival time is three to four years.—P.F.W.


Leukemic liver infiltration usually destroy the lobuli pattern. If, following treatment there is a regression of the infiltrations, a collagen tissue appears. The final picture may be similar to primary liver cirrhosis.—C.M.
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Subcutaneous injections of colchicin (12 γ) resulted in serious leukemic alterations with leukocyte counts up to 257,000. The bone marrow gave a myelocytic picture. Also the liver showed infiltrations of granulocytes. The question whether these effects are to be considered as a simple reaction or as a true metaplasia is not decided by the author.—C.M.

MACROCYTIC HEMOLYTIC ANEMIA IN CHRONIC LYMPHADENOSIS. F. Heřmanský. From the Medical Department, State Hospital Motol, Praha. Čas. lék. 89: 892, 1950.

A woman of 77 years with chronic lymphatic leukemia complicated by an acquired macrocytic hemolytic anemia was observed for ten months. Repeated bone marrow investigations revealed that all exacerbations of the hemolytic process were accompanied by an erythropoietic hyperplasia of the normoblastic type and by a regression of the lymphocytic infiltration of the bone marrow. The Coombs test was repeatedly positive. Therapy with arsenic was without any effect both on the leukemic growth and hemolysis; its single effect was a marked karyorrhexis in the erythroblasts. There was a clinical remission after the first series of nitrogen mustard injections (czech TS 160) with the return of the peripheral red and white blood count to normal values. The second series of TS 160 was, however, followed by an early depression of the bone marrow. The hemolytic anemia remained uninfluenced. Even massive blood transfusions failed to stop the fatal progression of the hemolytic anemia in this senile and arteriosclerotic subject.—M.N.

ALEUKEMIC RETICULOSIS. M. Mitera, J. Lukeš and J. Vaněk. From the First Pediatric Clinic, the Second Pediatric Clinic and the First Pathological Institute, Charles University, Praha. Čas. lék. 89: 1051, 1950.

Four cases of a rare condition known as aleukaemic reticulosis (Lettere-Siwé disease) were studied clinically and pathologically. In 3, a detailed postmortem examination was made.

Excised lymph nodes and the skin from the fourth patient, who is still alive, were studied histologically. This patient was definitely benefitted by treatment with TS 160 (trichlor-ethylaminohydrochloride) and the changes in the histologic pattern, as shown in subsequent biopsies, were striking.—M.N.

HEMORRHAGIC DISEASE and BLOOD COAGULATION


The effect of the transfusion of 250 cc. of plasma or 500 cc. of whole blood from patients with thrombocytopenic purpura into nonthrombocytopenic recipients was studied. A prompt decrease in circulating platelets of the recipients, when it occurred, became apparent within thirty to sixty minutes and persisted for four to seven days. The effect was caused by the blood of 8 out of 10 patients with idiopathic thrombocytopenic purpura and 1 patient with secondary thrombocytopenic purpura due to chronic lymphocytic leukemia. There were 2 additional patients whose plasma failed to produce this reaction. These included 1 with chronic lymphocytic leukemia and 1 with hypoplastic anemia.

Bleeding time and prothrombin consumption were decreased in proportion to the severity of the thrombocytopenic reaction.

Initial studies on the nature of the thrombocytopenic factor show that it is a plasma constituent present in the globulin fraction and is stable in ACD solution at minus 5, plus 5 and plus 25 C. for at least nine days.
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Two patients were demonstrated to have the platelet-reducing factor following splenectomy, when the patients' platelet counts had returned to normal.—T.R.T., Jr.

HEMOPHILIA IN THE FEMALE. M. C. G. Israels, H. Lemperg and E. Gilbertson. From the University of Manchester, the Department of Clinical Pathology, Manchester Royal Infirmary, and St. Mary's Hospital, Manchester, England. Lancet 1: 1375-1380, 1951.

An undoubted case of hemophilia in a female is described with detailed laboratory investigations. Her parents both came from hemophilic but unrelated families and her blood showed all the characteristic responses to tests for hemophilic blood, i.e., whole blood and plasma clotting times were prolonged, there was deficient prothrombin consumption and her plasma would not correct the defective coagulation of known hemophilic blood. Symptoms had consisted of a tendency to bruise easily, epistaxes and occasional swelling of the joints. She had a normal delivery of a healthy female child, but during the puerperium, developed a severe hemorrhage necessitating a hysterectomy.—S.T.C.

ENZYME STUDIES ON HUMAN BLOOD. XI. THE ISOLATION AND CHARACTERIZATION OF THROMBOPLASTIC CELL AND PLASMA COMPONENTS. G. Y. Shinowara. From the Department of Pathology, Ohio State University, College of Medicine, Columbus, Ohio. J. Lab. & Clin. Med. 38: 11-22, 1951.

Data are presented concerning the isolation and characterization of two substances from normal human blood, thromboplastic cell component (TCC) and thromboplastic plasma component (TPC). They differ greatly in chemical and physical properties as well as in source. However, they have similar biologic effect: together, but not separately, they behave like tissue thromboplastin in respect to the extent and the rate of prothrombin activation.

The fact that the data suggest a stoichiometric relationship between these two substances, rather than the fact that one is an enzymatic precursor and the other is an activator, tends to negate the active enzyme as well as the zymogen-kinase concepts of blood thromboplastin activity.

The author has presented and discussed a concept of coagulation mechanism not involving tissue thromboplastin.—T.R.T., Jr.

ENZYME STUDIES ON HUMAN BLOOD. XII. THROMBOPLASTIC PLASMA COMPONENT AND OTHER COAGULATION FACTORS IN HEMOPHILIA. G. Y. Shinowara. From the Department of Pathology, Ohio State University, College of Medicine, Columbus, Ohio. J. Lab. & Clin. Med. 38: 23-27, 1951.

In the previous paper it was demonstrated that the nonclottable globulin of fraction 1 and a lipoprotein of platelets and other blood cells, acting together, activate prothrombin. The present study includes the determination of these components (TCC and TPC) and other coagulation factors in blood from 12 patients with hemophilia.

The data indicate that the hypocoagulability of hemophilic blood is due to a marked deficiency of the TPC. The data also show that TPC and antihemophilic globulin are identical. Furthermore, the data are not compatible with the conclusion that the deficient factor is a thromboplastin zymogen or a substance which releases active thromboplastin from platelets. This confirms the findings of Brinkhous, Quick and others that hemophilia is a plasma deficiency disease.—T.R.T., Jr.

EXPERIMENTS ON A NEW CLOTTING FACTOR (FACTOR VII). F. Koller, A. Loeliger and F. Duckert. From the Department of Medicine, University of Zurich, Switzerland. Acta Haemat. 6: 1-18, 1951.

The authors describe experiments on the Factor VII, which accelerates thrombin formation without increasing the amount produced. The factor is related to prothrombin, but may be separated by (1) the coagulation process itself (prothrombin is consumed, whereas Factor VII remains unchanged), (2) by adsorption methods, (3) by dicumarol which in
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the first days produces a much more rapid drop of Factor VII than of prothrombin. Methods for isolation and preparation of Factor VII are presented.—C.M.


A method is described which is designed to measure the optical densities of plasma before and after clotting. It is stated that a general correlation exists between clot density and corrected sedimentation rate and that it may be of value in patients undergoing anticoagulant therapy.—T.R.T., Jr.


Aureomycin, 2 Gm. per day for seven to ten days, was administered to 5 healthy adult males. The effects were determined by measurements of stool and urine urobilinogen, stool and urine and serum bilirubin, cephalin flocculation test, clotting time and prothrombin percentage. There was a control period of two days.

Urobilinogen disappeared from the stools and was replaced by an increase in stool bilirubin. The cephalin flocculation test, serum bilirubin and prothrombin percentage were unaltered. Small amounts of urobilinogen persisted in the urine.

Four out of the 5 subjects showed a prolongation in clotting time during the administration of aureomycin.—T.R.T., Jr.

PLASMA PROTHROMBIN DURING PREGNANCY AND THE Puerperium. J. H. Olwin and E. Allen. From the Department of Surgery and the Department of Obstetrics and Gynecology of the Presbyterian Hospital of the City of Chicago, affiliated with the College of Medicine, University of Illinois, Chicago, Ill. Am. J. Obst. & Gynec. 60: 1363-1365, 1950.

The plasma prothrombin levels in 54 pregnant women were studied from as early as the fifth week of pregnancy to as late as the tenth week following delivery. The two-stage prothrombin assay of Warner, Brinkhous and Smith was used. The prothrombin accelerator factor was not rendered constant in the procedure. A total of 617 determinations were done, averaging 11 per patient. With the method used, a prothrombin level above 110 per cent in the healthy adult is rare. In the present study, 81 per cent of the 54 patients had a prothrombin at some time in pregnancy of 110 per cent or above. The explanation of this rise in prothrombin is not understood.—R.B.C.


The mechanical firmness of a thrombus is of great physiologic importance. The author constructed a new apparatus which measures graphically the elasticity of the thrombus during its formation. The curves obtained, enable the study of the coagulation and retraction phase in different physiologic and pathologic conditions.—C.M.


The author describes the different stages of the thrombocytes in the course of blood coagulation based upon electronic photographs. The increased intravascular coagulation of the thrombocytes seems to be the primary stages of thrombosis. Next the platelets begin to disintegrate, thrombokinase is freed and takes part in the process of coagulation. On the other hand, the plasma thrombin stimulates thrombokinase formation. The paper is well illustrated with electronic photographs.—C.M.