ABSTRACTS OF SPECIAL INTEREST

CROMOSOME ABNORMALITIES IN WALDENSTROM'S MACROGLOBULINEMIA. C. Bottura, I. Ferrari and A. A. Veiga. From the Medical School of Ribeirão Preto, São Paulo, Brazil. Lancet, May 27, 1170, 1961.

A white man aged 71 was hospitalized with the clinical picture commonly associated with Waldenström's macroglobulinemia. The characteristic "lymphoreticular" hyperplasia, an increased number of tissue mast cells, and hypoplasia of the myeloid tissue were observed in sternal and iliac bone-marrow. Postmortem examination confirmed the diagnosis. Lymphatic leukemia, lymphosarcoma and multiple myeloma were not found. Chromosome studies were performed on sternal marrow cells by an original method which does not involve culture. The chromosome counts on 100 cells were:

<table>
<thead>
<tr>
<th>No. of chromosomes</th>
<th>Cells counted</th>
</tr>
</thead>
<tbody>
<tr>
<td>45</td>
<td>2</td>
</tr>
<tr>
<td>46</td>
<td>41</td>
</tr>
<tr>
<td>47</td>
<td>49</td>
</tr>
<tr>
<td>48</td>
<td>5</td>
</tr>
<tr>
<td>49</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>100</td>
</tr>
</tbody>
</table>

The chromosome number ranged from 45 to 49, with a modal number of 47. Cells with 46 chromosomes had a normal karyotype, and were probably normal erythroblasts in mitosis. In all but five of the cells with 47 chromosomes, we observed an extra chromosome, morphologically well defined, which could be considered as a "marker" element. It was of the same size as the largest pair in the set, and the centromere was almost subterminal. Only in one cell with 48 chromosomes, and in one with 49 was this chromosome not seen; and it was present in many cells in which a count could not be confidently made.—M. I.


Previous studies of mitotic indices indicated a production of 16 x 10⁶ lymphocytes/hour in rats, and in man the number of lymphocytes entering via the thoracic duct equals the total number in the circulation. H³-thymidine studies in rats with thoracic duct fistulae were compatible with the hypothesis of lymphocyte recirculation (blood-lymph-blood) mainly via liver lymph vessels. This fact, and the assumed "recirculation" of lymphocytes via bone marrow (lymphocytes-bone marrow cells-blood cells), suggests a "carrier cell" function for lymphocytes to the author, possibly in the form of a DNA-transfer to other cells. The finding of labeled fibroblasts and epidermis cells in the wounds of rats, who were traumatized four days after receiving H³-thymidine, when the
only available radioactivity presumably was in lymphocytes, is compatible with the hypothesis of a DNA-transfer. Even in transplanted skin, some labeled epidermis-cells were found, and in this case the label could hardly originate anywhere but in host-cells. (Abstractor's comment: The definite demonstration of DNA-transfer would have profound implications upon the concept of cytoplasmic genes and of the manner in which cells receive information.) — P. G. R.

**Post-Irradiation Changes in Peripheral White Blood Cells Observed with Fluorescent Microscopy.** R. Harding, A. Stein and J. Maura.


Previous workers demonstrated a post-irradiation change in the fluorescence of rat peripheral leukocytes and marrow stained with acridine orange. Cytoplasm of mononuclear and polymorphonuclear leukocytes usually fluoresces green in nonirradiated animals, but a substantial percentage will fluoresce red 3–24 hours following sufficient irradiation. The authors obtained serial specimens on 15 patients with various malignancies before, during, and after therapeutic courses of radiation to different areas. “Total roentgen doses” are tabulated, but no attempt was made to determine the dose-volume, i.e., gram-rad. About one-half of the patients showed the marked change in fluorescence noted earlier. The maximum per cent of mononuclears fluorescing red before irradiation was 4.2 in one patient; several patients showed increases to 15–25 per cent post-irradiation. Nitrogen mustard appeared to produce a similar effect. The change in fluorescence is felt to be related to increase in net cellular RNA content, whether from damage to existent cells, or increase in the peripheral percentage of young cells.—J. L. B.


A cell-free system from reticulocytes allows the incorporation of amino acids into microsomes and the synthesis of hemoglobin. The kinetics of both phenomena have been established. The incorporation of amino acids into microsomes requires an energy source, is activated by guanosine triphosphate, but may occur in the absence of pH 5 enzyme. Reticulocyte pH 5 enzyme is required for the biosynthesis of hemoglobin; it cannot be replaced by transfer ribonucleic acid nor by liver pH 5 enzyme. This suggests an organ-specificity for the pH 5 enzyme. Incubation with subcellular fractions obtained partly from rabbit and partly from guinea-pig reticulocytes allows both hemoglobin to be synthesized in all cases. However, when rabbit microsomes are incubated with chicken pH 5 enzyme, only rabbit hemoglobin is synthesized. The information needed for the synthesis of hemoglobin is carried by a factor present both in microsomes and in pH 5 enzyme. If the two fractions are not obtained from the same species, they apparently both express themselves only if the species are closely related.—G. M.

**LEUKOCYTES**


A chromatographic study on DEAE cellulose from normal leukocytes and from leukocytes of chronic myeloblastic leukemia has indicated the presence of three peaks of LAP activity. In acute leukemia the first peak was missing. Two other peaks appeared after blood transfusion.—P. d. N.


In leukocytes from normal subjects and from patients with acute and chronic myeloblastic leukemia, five peaks of LDH activity were identified by means of DEAE-cellulose columns. There is a reduction of the first peak in connection with the degree of immaturity of the leukemic cells, and an increase of peaks 2, 3, 4 in leukemic cells. —P. d. N.

Phosphorylase activity in leukocytes was found to be low in two cases of glycogen storage disease of the hepatic phosphorylase-deficient type. There was a good correlation between the relative hepatic phosphorylase-deficient type. There of the approach in leukocytes may provide a useful diagnostic approach in the glycogen storage diseases.—T. E. B.


Rabbit polymorphonuclear leukocytes were incubated with glucose and galactose labeled in varying positions with carbon 14. The C14 distribution pattern in glycogen, lactic acid and lipid glycerol was then observed. The data from the glycogen degradations suggested that a small amount of the label reached glycogen by means of a transaldolase exchange reaction rather than through more direct pathways. Data from the lactate degradations suggested that the labeled hexoses were catabolized mainly by the Embden-Meyerhof pathway. Less than 0.1 per cent of the initial radioactivity of the labeled glucose was found to have entered lipids.—T. E. B.


The stimulation of leukocytic respiration which is known to occur when the leukocytes are incubated in the presence of latex particles was shown to vary markedly with both particle size and particle concentration.—T. E. B.


Guinea pigs were immunized with antisyphilis vaccine. Samples of peritoneal exudates containing leukocytes were collected daily, and phagocytic activity assayed by incubation with Flexner's bacilli at 37 C. Every 10 minutes leukocytes from the incubation mixture were examined for phagocytic number (PN), glycogen, and peroxidase. In all situations maximum PN was obtained following 20 minutes incubation, after which the number declined. Highest PN of 1.89 (control = 0.82) was evident three days after the last injection of vaccine. The percentage of leukocytes showing peroxidase and glycogen was also highest on the same day. Since phagocytosis in nonimmunized animals uses up much peroxidase and glycogen, some evidence is here presented of the possible mechanism by which immunization increases the phagocytic power of cells.—J. J. B.


A single dose of P32 was given intravenously to rabbits and then serial studies were made of the specific activity found in various fractions of circulating leukocytes and of marrow cells. Rapid increase of labeled DNA-phosphorus in circulating leukocytes did not begin until about two days after injection, and maximum specific activity was reached four days after injection. Lymphocytes contributed little or not at all to the specific activity of circulating leukocytes. In marrow cells maximal labeled DNA-phosphorus was found within 24 hours of injection of P32.—T. E. B.


Fixed peripheral blood films were flooded with fresh normal urine before application of a Giemsa stain to the films. It was observed that in blood smears from patients with chronic myelocytic leukemia, nuclear blanching occurred, i.e. the nuclei of many neutrophil cells of all ages failed to take the Giemsa stain. Such nuclear blanching occurred only slightly in leukemia reactions and did not occur at all in many other conditions including normals, patients with acute myelocytic leukemia, and patients with myeloid metaplasia. —T. E. B.


The intradermal inoculation (but apparently not the subcutaneous inoculation) of peripheral leukocytes before full thickness skin grafting resulted in accelerated rejection, sometimes markedly so, of the first set skin homografts. Skin homografts were provided simultaneously by both the leukocyte donor and a second nonspecific donor. Data obtained suggested that degree of acceleration of skin graft rejection seen was related to both the dose of immunizing leukocytes administered and the genetic similarity between the donor of the immunizing leukocytes and the donor of the nonspecific skin graft.—T. E. B.


It has been shown that lymph node cells taken from a rabbit recently immunized to a specific antigen and transferred to an homologous rabbit not immunized to the specific antigen will form antibodies in the recipient to the antigen in question. The capacity of the transferred lymph node cells to make antibody can be suppressed by prior injection of the recipient animal with an adequate number of donor peripheral blood leukocytes or by simply injecting the recipient animal with antiserum against rabbit leukocytes. Using this interesting system, the authors compared the immunologic responsiveness of neonatal and of mature rabbits. Several apparent similarities were found, but also one striking difference. The sera of neonatal rabbits injected with rabbit leukocytes were far less effective than similar sera from adult rabbits in passively transferring the suppressive effect on transferred lymph node cells.

—T. E. B.


The author discusses in the light of observations with the electron microscope the means by which antigens are absorbed into cells, the ultrastructure of plasma cells and lymphocytes, the means by which antibodies may be excreted from the cells in which they are formed, and, finally, morphologic changes found in malignant lymphocytes and plasma cells.—T. E. B.

Eosinophilia was induced in the peritoneal cavity of guinea pigs by the passive transfer of antigen-antibody complexes. The author believes that he has provided direct evidence that eosinophilia is induced by immune complexes, and he speculates at length upon the significance of his observation.—T. E. B.


Stored human marrow was incubated with tritiated thymidine and then marrow smears were studied by radioautography. The percentage of cells with specifically labeled nuclei was considered to be a useful index of marrow viability. After three days or more of refrigerator storage of a marrow specimen there was virtually no labeling to be a useful index of marrow viability. After—T. E. B.


Normal whole blood being routinely stored in acid-citrate-dextrose solution was found to develop marked resistance to passage through a microfilter with multiple openings 20 μm². This property appeared within 2–10 days of beginning blood storage and was shown to be produced principally by the formation of aggregates of platelets and leukocytes. Such aggregates can be efficiently removed by passage of the blood through glass wool but not by passage through the routine filter of a transfusion set. The author wonders if the platelet-leukocyte aggregates might not be capable of producing widespread micro-infarctions in the organs of the blood recipient.—T. E. B.


Eight different leukoagglutinating sera from multiparous women were used to study the inheritance of human leukocyte antigens. The data obtained were consistent with the hypothesis of genetic control of leukocyte antigens.—T. E. B.


This is apparently the first reported case of agranulocytosis associated with amphenidone therapy.—T. E. B.


Necropsies of 157 cases of acute leukemia indicated hemorrhage to be primary cause of death in 43 cases (20 in central nervous system and 15 generalized). In 55 cases, infection was the primary cause (pulmonary in 33 cases and generalized in 15); and in 19 cases acute ulcerations in gastrointestinal tract proved lethal.—P. G. R.


In an initial series of 40 cases of malignant lymphoma, 5 coexistent carcinomas were found, 4 of which were among 20 cases with lymphosarcoma. In later series of 100 “benign” rectal lymphomas there were 7 cancers. The present series contains 585 autopsies, 265 leukemias with 9 coexistent carcinomas, 43 myelomas with 2 carcinomas, and 280 malignant lymphomas with 6 cancers. These incidences do not indicate a correlation between cancer and leukemia.—P. G. R.

RADIATION INJURY

From the parent colony, (brother-sister mated for over 40 generations), two male-female pairs were selected, one to establish the "control" line, the other to begin the experimental line. The former pair was mated at maturity, and serial sib-mating at maturity was carried out to the F-12 generation, 58 of which served as the final control group. The "experimental" line was similarly carried, except that each male at 28 days of age received 200 rads of whole body radiation, from the F_{1} through the F_{10} generations inclusive. The F_{11} male was not irradiated, and 85 mice from the succeeding (F_{12}) generation served as the final "experimental" group. At 42 days of age, experimental and control groups were both placed in Co^{60} exposure fields of 4.17 rads/hour and maintained until death. Mean accumulated doses for males and females of the irradiated line were respectively 23 per cent and 26 per cent less than for the control groups, at the 0.01 level of significance. An accumulation of recessive and/or sublethal mutants in the ten generations of irradiated males is proposed.—J. L. B.


The author differentiates pathologic processes which occur more frequently with increasing age from the more subtle reductions in organ function and cell population that may more accurately manifest the aging process. A breakdown is presented of the major tissues and organs of man, with respect to parenchymal radiosensitivity and the morphologic and functional decline with aging. Some parallelism is noted, but the picture is clouded because of 1) the dependence of tissues on an intact vasculature and 2) paucity of data on functional and reserve capacities of tissues and organs. The conclusion is that radiation may become a valuable tool toward clarification of the aging process, but not until physiologic assay can be improved.—J. L. B.


The authors studied life-shortening in mice exposed to 13 daily doses of either 1) fission neutrons at 4.4 rads per minute or 2) Cobalt-60 γ-rays at 13 rads per minute. Graded exposures in each case were achieved by stepping the length of each daily exposure. Fifty per cent reduction in mean life span was effected by either 480 rads of Co^{60} gamma or 300 rads of fission neutrons with a resultant relative biological effectiveness (RBE) for the neutrons of 1.6. Repetition of this experiment, with reduction of the dose rate for both radiations to one rad per minute, resulted in values of 888 (+) rads for Co^{60} gamma and 350 rads of neutrons, with an RBE for neutrons of 2.5 (+). A third experiment demonstrated no significant difference in life shortening by fission neutrons, whether delivered in one brief exposure or in a series of 10 daily fractions. The authors conclude that similar RBE values of fission neutrons were obtained for life-shortening as for their previous 30-day 50 per cent lethality study, and discuss the findings with other data in the literature.—J. L. B.

**ABSTRACTS**

**Structural, Cytologic and Autoradiographic (H^{3}-Thymidine) Changes in the Bone Marrow Following Total Body Irradiation.** T. M. Fliedner, V. P. Bond and E. B. Cronkite. From the Medical Research Center, Brookhaven National Laboratory, Upton, L. I., N. Y. Am. J. Path. 38:5, 1961.

Rats received 550, 1000, and 1500 r and were sacrificed one hour or 10 days later. They received H^{3}-thymidine one-half hour before death. Replacement of bone marrow cells with peripheral blood (hemorrhage?), nuclear damage, and the mitotic abnormalities are described. The percentage of H^{3}-thymidine-labeled cells decreased with time after irradiation, and was lower in animals which received the most radiation.—P. G. R.


The authors followed the induction and development of osteosarcomas with serial roentgenograms, following the intravenous administration of Sr^{90} in equilibrium with γ^{90} in a dosage of 0.9 μC/Gm. (average) to 29 CF-1 and 1.03 μC/Gm. (average) to 24 CBA mice. The animals were females of 10 weeks approximate age. One hundred and twenty-five osteosarcomas developed in the CF-1 mice, the first at 98 days and 50 per cent by 175 days with a Poisson distribution. Ninety-six osteosarcomas appeared in the CBA mice, the first at 180 days, and 50 per cent by 245 days with a similar distribution of incidence. Considerable variation was noted in 1) the number of
ABSTRACTS

631

tumors per animal and 2) the relative rates of growth of different tumors in the same animal. Mortality curves for the two strains lagged behind the respective tumor incidence curves by about 30 days. Analysis of the roentgenogram data revealed no predilection of tumor for any particular bcn. Plotting of absolute tumor incidence by roentgenometric methods per animal and 2

a rate of some difference in rate of tumor growth noted, what appears to be prolongation of the first phase of osteosarcoma growth, with apparent independence of tumor growth. The authors point out the difference in tumor morbidity determined by roentgenogram as compared to the frequently employed collection of morbidity data at demise. Concluding discussion relates to the apparent three phases of osteosarcoma growth, with what appears to be prolongation of the first phase in the CBA mice. (Abstracter's note: It would be of interest to determine whether the maximum morbidity rate is a function of initial Sr90 dose).—J. L. B.

UNUSUAL BONE TUMORS AFTER ROENTGEN THERAPY OF CHILDREN. J. Cohen and G. J. D'Angio.

The authors review 8,321 cases of children treated with ionizing radiation from 1938 to 1957 inclusive. Of these, 7,423 with benign processes received estimated bone doses of generally less than 500 r and rarely over 1,000 r, and showed no incidence of postirradiation bone tumor. Eight hundred and ninety-eight cases, generally with malignancy, received higher doses and 247 cases surviving two years presented data for analysis. Doses to bone in the latter group were generally over 1000 r. Two cases from this group of tumor development postirradiation of normal bone are described. The first patient, nephrectomized and irradiated to the flank at age one year for an embryoma of the left kidney, 13 years later was diagnosed as having (after resection) a tumor of the left 11th rib, composed mainly of cartilaginous and myxoid elements. The second case, nephrectomized and irradiated to the flank at age three years for a right-sided Wilms' tumor, also received irradiation of the left hemithorax for a hilar mass. Two years later, the previously normal left ninth rib revealed a tumor, which after operation was diagnosed as being mostly fibrillar, but with areas suggestive of immature bone matrix. The authors feel these cases were probably due to the previous irradiation, and point out the relatively high incidence of apparently radiation-induced tumors in children included in the 86 cases in the literature. In addition, both of the cases reported showed postirradiation scoliosis and underdevelopment of the ileum.—J. L. B.


Fecal excretion in rats of 131-I-labeled polyvinylpyrrolidone (PVP), a plasma protein substitute, was employed as a measure of intestinal vascular permeability postirradiation. (Previous work by the author had shown increasing excretion, approximately proportional to dose, from 250 to 1000 r). Fifteen hundred r of 250 KVP x-ray and 2.0 mg./Kg. nitrogen mustard actually produced less PVP excretion in the three days post-irradiation than 1000 r of the former and 1.0 mg./Kg. of the latter. This paradox was attributed to the increased cellular destruction and fluid losses at the higher doses. Whole body and partial body (various areas) exposure to 1000 r demonstrated that irradiation of 10 cm. of jejunum produced as much PVP excretion as entire intestine irradiation, and more than whole-body irradiation. Animals with biliary fistulae did not experience an increase in fecal PVP postirradiation, even when the collected bile was reinjected. This mechanism was not clear. Cysteine (preirradiation) significantly reduced PVP excretion.—J. L. B.


In vitro preparations of dog and swine aorta were made whereby perfusion with Tyrode's solution and simultaneous irradiation with a Co60 source could be accomplished. With an exposure rate of 626 r/min., 20–52 per cent of arteries tested (in replicate experiments) constricted slightly during the first minute of radiation, and dilated to normal size during the first minute following completion of the usual 15 minute irradiation period. This effect was also seen when mineral oil replaced the Tyrode's solution surrounding the artery. Decreases in vasa vasarum flow obtained under the first conditions, however, were not
present under the latter, and were attributed to ionization of the Tyrode's solution.—J. L. B.


This paper describes 80-day survival and daily food consumption in four major categories: 1) non-irradiated, 23 C. environment; 2) nonirradiated, 6 C. environment; 3) irradiated, 23 C. environment; and 4) irradiated, 6 C. environment. All irradiations were 250 KVP x-rays at 25 r/min., 40 inch TSD, and HVL = 1.5 mµc, to the same total dose of 600 r, but multiple groups of 14-25 rats each at both temperatures were provided to allow either single exposures or 8-part fractionation, the latter with intervals of 1, 3, 5, or 7 days. Survivals resulting from the single exposure were 35 per cent at 23 C., but only 5 per cent at 6 C. Significant increase in survival with fractionation appeared with irradiation intervals of 24 hours for the 23 C. animals, but not until intervals were increased to 48 hours for the 6 C. animals. Food consumption in irradiated groups at both temperatures fell below their respective controls, but rose to control levels by the 10-15th day post-irradiation in the 24-hour interval rats. "Pair-fed" nonirradiated rats at both temperatures (restricted in feeding each day to the same quantity consumed the preceding day by the respective irradiated [75 r daily] group) underwent initial weight loss and subsequent recovery comparable to the irradiated animals at both temperatures. Twenty-five per cent mortality appeared in the pair-fed nonirradiated rats maintained at 6 C. Possible mechanisms are not discussed.—J. L. B.


Strength, upright and righting reflexes, and locomotor learning were tested at one month of age in 500 rats derived from mothers receiving 25, 50, or 100 r on day 5, 10, 15, or 20 of the 22-day gravid period. Radiation was 250 KVP, HVL = 1.8 mµc, at an "in air" dose rate of 9.4 r/min. Results showed reduction to 57 per cent of normal in both upright and righting responses (significance at the 0.05 level) for offspring receiving 100 r on the 15th intrauterine day. The same group performed at only 13 per cent of normal (significance at the 0.01 level) in strength testing, and showed reduction in locomotor learning (significance at the 0.01 level). Findings are briefly discussed with respect to fetal maturation.—J. L. B.
HEMOSTASIS


Antifibrinogen sera were obtained by immunizing rabbits with human fibrinogen. Specificity was tested by means of double diffusion agar-gel and microimmunoelectrophoretic technics, and by incubation of plasma or fibrinogen with antifibrinogen serum. The antifibrinogen antibodies were also detected in rabbits born from immunized mothers.—P. d. N.


Seventy-five patients received daily intramuscular injections of 100 μg of vitamin B12 for 14 days. In most of them, plasma cholesterol fell by 20 per cent irrespective of the original level, whereas plasma phospholipids increased. As a result the phospholipid/cholesterol ratio rose to above one. Little change was observed in prothrombin levels, but in a few instances the prothrombin time was shortened.—J. J. B.


Studies on blood coagulation in atherosclerosis were carried out with the purpose of establishing 1) the interrelations between the alterations of blood coagulation due to the atherosclerotic process and those due to advanced age; 2) the influence of cholesterol on blood coagulation in experimental hypercholesterolemia; and 3) the modifications of blood coagulation due to atherosclerosis following the treatment with essential phospholipids. It has been shown that aging it-
Sarcoma Type M-I or Type 45 was transplanted into male rats. In 20 controls, average plasma fibrinogen was 340 mg./100 ml. and thromboplastic activity 90 sec. During tumor growth a rise in fibrinogen and an increase in thromboplastic activity were observed. The change started almost immediately after transplantation. In two weeks, average level of fibrinogen was 920 mg./100 ml. and thromboplastic activity 59 sec. Little difference was observed between the two types of tumor.—J. J. B.


Thrombotest was used for controlling the anticoagulant activity of an indanedione derivative. A good correlation was found between thrombotest and the P & P method. A less satisfactory correlation was found with the prothrombin time. Thrombotest is particularly suitable for detecting factor IX modifications, particularly when prothrombin activity is less than 20 per cent. The simplicity of the technic and the consistent results obtained are outlined. The possibility of preventing hemorrhagic complications by means of thrombotest represents a considerable advantage for long-term anticoagulant therapy.—P. d. N.

ERYTHROCYTES


Normal rabbits and rabbits treated with multiple injections of colcemid were given an intravenous injection of 5 μC/Kg. of Fe followed by a second “flooding dose” of nonradioactive iron in order to determine the iron utilization of their erythrocytes. The maturation time of the most immature erythroblasts (proerythroblasts) and the mature erythroblasts (incapable of division) was calculated from the time necessary for the iron utilization of erythrocytes of both groups of animals to reach the maximum level. Reticulocyte maturation time was estimated in the injected animals by successive determinations of the reticulocyte counts after the injection of colcemid. 1) In normal rabbits the maturation time of the mature erythroblasts averaged 16.8 ± 2.4 hours, and the time required for the most immature erythroblasts (proerythroblasts) to grow into the circulating reticulocytes was estimated to be 73.5 ± 3.8 hours. 2) Reticulocyte maturation time averaged 28.5 ± 3.1 hours, which coincided with the calculated value based on the estimation of erythrocyte life span and the reticulocyte percentage, i.e., 25.9 ± 4.3 hours.—K. F.


Lactic dehydrogenase (LDH) and leucylaminopeptidase (LAP) were studied in erythrocytes by means of column chromatography on DEAE cellulose. LDH was similar in normal erythrocytes and in erythrocytes from patients with Cooley’s disease. LAP was different in the two conditions. —P. d. N.


Guinea pigs were poisoned by petroleum inhalation (60 mg. per liter, for 80 days, 8 hours daily, in a chamber of 10 M³, at 28 C.). Erythrocytes, leukocytes, platelets, reticulocytes, hemoglobin, erythrocyte diameter and volume, osmotic fragility of erythrocytes, differential count of leukocytes, Arneñ count, platelet agglutinability and adhesiveness, hematocritic value, and bone marrow biopsies were carried out. Alterations were first detected in the peripheral blood, as a diminution of the various values, and later in the bone marrow, particularly in the erythropoietic and thrombocytopenic series, both in the formation and evolution of the concerned elements.—P. d. N.