TRANSVAAL SOCIETY OF PATHOLOGISTS

SUMMARIES OF SCIENTIFIC PAPERS*

1. THE HUMAN ECCRINE AMPULLA

DR. L. J. A. LOEWENTHAL, *Johannesburg*

Serial sections from human skin stained with PAS show a structure, about 50 micra in length, between the secretory and ductal portions of the sweat coil. This structure stands out clearly with this staining method and shows an abrupt change from the predominantly red secretory cells to a single row of cubical cells, with large nuclei which show an avidity for basic stains. There is a layer of myo-epithelium continuous with that of the secretory portion and at the distal end this changes to a circular arrangement, presumably a sphincter. In certain sections canaliculi can be shown to open in the lumen and staining with PAH shows that these are situated in the inter-cellular cement substance. Histochemical methods carried out so far show alkaline-phosphatase activity of the free surface (that part which becomes cuticle further on in the duct). Acid phosphatase activity stops abruptly at the beginning of the ampulla and is present in the early portion of the duct beyond the ampulla. RNA is present, beginning abruptly at the end of the secretory portion and continuing along the duct.

The structure probably has two functions: (1) to regulate the flow of sweat by means of its sphincter, and (2) the resorption of sweat constituents by means of the canaliculi. An analogy to the renal tubules is suggested.

2. THE ISOLATION AND HOST RANGE OF A SERIES OF LACTOBACILLUS PHAGES

DR. H. C. DE KLERK, *Institute for Pathology, Pretoria*

The isolation of a series of 14 bacteriophages active on lactobacilli is described. The host range of the phages as determined by both lytic and abortive infection is discussed.

* Read at a meeting of the society held in Johannesburg on 15 October 1960.

3. THE NATURE AND SIGNIFICANCE OF ALCOHOLIC HYALINE

PROF. B. J. P. BECKER, *University of the Witwatersrand, Johannesburg*

Hyaline ramifying masses within the cytoplasm of liver cells were first described by T. B. Mallory in 1911 and labelled 'alcoholic' hyaline. Although Mallory's hyaline occurs in a wide variety of liver diseases and is pathognomonic of none, it is present in virtually 100% of livers showing fatty cirrhosis where there is a history of chronic alcoholism. Its presence signifies severe, probably irreversible, cell damage.

Histochemical examination shows that the material consists of a solvent-resistant, choline-containing phospholipid bound to a basic protein of histone type. The material does not contain any carbohydrate or nucleic acid. Calcium and phosphates occur occasionally.

The histone content represents degraded RNA, and the choline-containing phospholipid is probably derived from mitochondria or microsomes. Mallory's hyaline therefore represents degraded, disorganized, labile liver cytoplasm in which most of the enzymatic activity of the liver cell is concentrated. Its presence indicates virtually complete enzymatic paralysis.

The aetiology and pathogenesis remain obscure. The material can be experimentally produced by a low-protein, high-cholesterol diet without consumption of alcohol. It can also be produced in most cases of alcoholic fatty cirrhosis where dietetic influences are believed to be important. Thus, it is possible that Mallory's hyaline represents a type of nutritional hepatic injury.

In liver disease in Bantu patients the material is scanty, even in the rare cases of fatty cirrhosis of Bantu adults.

4. ACETYLCHOLINESTERASE AND THE LIFE SPAN OF THE ERYTHROCYTE

DRS. N. J. VAN RENSBURG, K. STEVENS and J. METZ, *South African Institute for Medical Research, Johannesburg*

The function of the relatively large amount of the enzyme acetylcholinesterase which occurs in the red cell is unknown.

A deficiency in the enzyme has been found in the haemolytic anaemia, paroxysmal nocturnal haemoglobinuria, and also in aging red cells.

This paper describes attempts to determine whether normal levels of acetylcholinesterase are necessary for the normal survival of red cells. In the first experiment red cells of haematologically normal subjects were labelled with radioactive chromium and re-injected. Octamethylpyrophosphoramide (OMPA) was then administered to the subjects, and caused inhibition of the red-cell acetylcholinesterase activity to levels comparable with those found in paroxysmal nocturnal haemoglobinuria. In the three subjects studied no deviation from the normal red-cell survival curve was noted.

In these cases the effect of inhibiting the acetylcholinesterase activity in already-formed, circulating cells was studied. To observe the effect on red cells in the process of being formed, OMPA was first administered and the cells then labelled. In one of the two subjects in this study there was an initial rapid fall in the survival curve — a finding, however, not uncommonly seen in normal subjects. To elucidate this observation further, OMPA was administered to another subject, and after a few days radioactive iron was injected while the OMPA was continued. This ensured that only those red cells on which OMPA was acting during their formation were being labelled. No deviation from a normal red-cell survival curve was observed.

It is concluded that normal levels of acetylcholinesterase are not necessary for normal red cell life-span.

5. 'N VERGELYKENDE STUDIE VAN SEREBRO-VASKULÊRE INSIDENTE IN BANTOES EN BLANKES

DR. J. H. ENSLIN, *Instituut vir Patologie, Pretoria*

'n Reeks van 876 opeenvolgende outopsieverslae oor 607 Bantoe gevalle en 269 Blanke gevalle is nagegaan om die insidensie van serebrale bloeding en infarksie in die twee rassegroepe te vergelyk. Die Bantoegroep toon 12 gevalle van serebrale bloeding en 15 gevalle van infarksie. In die Blanke reeks is daar 6 serebrale bloedings en 22 infarkte. Daarbenewens toon 3 gevalle in elk van die rassegroepe bloeding sowel as trombose.

Die Blanke groepe en die Bantoe-groep met trombose toon 'n hoër persentasie-insidensie van serebrovaskulêre aterosklerose as die Bantoe bloedingsgroep. Die persentasie-insidensie van hipertensie in die Bantoe en blanke serebrale bloedingsreekse is hoër as in die ooreenstemmende infarksiereekse.

Die ondersoek staaf Laurie en Woods se bewering dat serebrovaskulêre insidente by die Bantoe algemeen voorkom. Dit is egter nie 'n aanduiding van die voorkoms van aterosklerose by die Bantoe nie. Gevorderde serebrovaskulêre aterosklerose is teenwoordig in slegs 33% van gevalle van serebrale bloeding.

Die skaarste van miokardiale infarksie in die Bantoe word weer eens beklemtoon en die voorstel word gemaak dat lokale vaskulêre faktore verantwoordelik mag wees vir die relatiewe hoë voorkoms van serebrovaskulêre insidente in hierdie rassegroep.

6. A MODIFIED UREASE TEST SUITABLE FOR CHARACTERIZATION OF STRAINS OF BRUCELLA ORGANISMS

PROF. G. C. VAN DRIMMELIN, *Veterinary Research Laboratories, Onderstepoort*

Typing of Brucella organisms by means of urease tests by the methods of van Slyke *et al.*, Conway, Schneider *et al.*, Christensen, Bauer, and Pacheco *et al.*, has not generally been found sufficiently reliable. The effect of pH concentration was therefore investigated. Employing soybean urease, it was determined that the pH threshold value is depressed by higher urease concentrations. The reaction is sensitive over a wide range, resulting in a shift of approximately pH 1·0 for each doubling of urease content.

Accordingly, a safe and reliable quantitative tube test was evolved for Brucella strains which, as demonstrated with the aid of colour slides, was able to be duplicated and was fully complementary to overseas data.

Placing of South African types of Brucella organisms on the scale for urease activity, shows the interesting diversity of local strains which obviously represent forms intermediate between the classical WHO reference strains.

The possible existence of iso-enzymes with different pH limits is mentioned with special reference to the suggestion that *Br. suis* may possess iso-urease which differs from *Br. melitensis* urease.

7. SOME OBSERVATIONS ON CONGENITAL GOITRE IN BOVINES

PROF. K. SCHULZ, *Veterinary Research Laboratories, Onderstepoort*

8. GLUTATHIONE ASSAY AND METABOLISM IN NORMAL AND DRUG-SENSITIVE RED CELLS

DR. R. E. BERNSTEIN, *Metabolic Research Unit, South African Institute for Medical Research, Johannesburg*

In recent years, an intrinsic metabolic defect of red cells, which is responsible for an acute self-limiting haemolysis of the older-age population of circulating erythrocytes on exposure to certain drugs, has been described. The defect, a genetic sex-linked susceptibility to drugs with considerable variation in racial incidence, is characterized by a low reduced-glutathione content and a deficiency of glucose-6-phosphate dehydrogenase. A major fraction of the red-cell reduced glutathione is vulnerable to destruction by drugs *in vivo* and *in vitro*, yielding a sensitive stability test on incubation with phenylhydrazines.

While sensitive subjects are most susceptible to haemolysis on treatment with the aminoquinoline antimalarials, numerous drugs have been implicated, e.g. sulphones, nitrofurantoin, sulphanilamide, phenacetin, aspirin, naphthalene, and an active unknown principle from the *Vicia faba* bean (the cause of favism).

This erythrocytic deficiency was found in about 10% of American Negroes. On the other hand, Caucasians, South American Indians, Chinese, etc., have a very low incidence, while Mediterranean and Middle East races have a 10 - 30% incidence. Judged by the *in vitro* glutathione stability test, an incidence of 2·5% was present in 600 Bantu specimens examined. The sensitive red cells showed a significantly lower reduced-glutathione level, an increased Heinz-body formation on incubation with phenylhydrazine, and an activity of glucose-6-phosphate dehydrogenase $^1/_8$ - $^1/_{10}$ that of normal red cells. Smaller numbers of other South African racial groups have been investigated.

While the glucose-6-phosphate dehydrogenase deficiency may be the primary genetically-controlled defect, it is possible that reduced gluthathione, its co-factor, may play a critical part in its metabolic action. This is postulated because the rate of synthesis of reduced glutathione from its constituent amino acids *in vitro* in the sensitive red cells was ½ that for normal erythrocytes.

9. SOME ASPECTS OF REGENERATION IN CIRRHOSIS OF THE LIVER

DR. I. W. SIMSON, *Institute for Pathology, Pretoria*

The mitotic indices were investigated in two groups of cirrhosis of the liver — fatty septal and postnecrotic cirrhosis. In both groups the indices were low. It is therefore suggested that the nodules in these two groups of cirrhosis could not be regarded as actively regenerating.

On the basis of these findings and on the available evidence in the literature, a scheme is proposed, depicting the variations in mitotic activity during the pathogenesis of the lesion in each group.