THIS YEAR AT DALHOUSIE

It is essential that the Journal review its purpose from time to time. The first Journal publication in April, 1936, set forth its objectives as twofold, as follows: "to encourage and train the medical undergraduate in the preparation of scientific articles and to act towards a closer association between past and present students of our University." The Journal is now reaching approximately 1655 physicians in the Maritimes, most of whom are Dal graduates. To achieve this closer association is not an easy undertaking. However, for these interested readers, the Journal will attempt this year to reflect current trends in thought and clinical research here at Dalhousie by presenting abstracts of student research projects in the various departments. This issue will be devoted to the Department of Medicine.

Under the direction of Dr. G. R. Langley, Robert A. Tingley (fourth year) conducted a family study concerned with Acute Intermittent Porphyria.

"The best known and most widely studied defect in acute intermittent porphyria (AIP), a hereditary, metabolic disease, is a breakdown in the biological control systems for heme synthesis leading to an accumulation of the porphyrin precursors - delta aminolevulinic acid (ALA) and porphobilinogen (PBG).

"As part of our work we studied 15 members of the family of a 22 year old white female who developed an attack of AIP in March 1967. We interviewed each family member and did a quantitative analysis for PBG and ALA on a 24 hour urine specimen. We found two cases of latent porphyria (no symptoms, but excreting elevated levels of ALA and PBG), and three other cases which should be suspected because of their previous clinical history, two of the latter group were excreting normal amounts of the porphyrin precursors at the time of the test, and they should be retested if any symptoms suggestive of an attack of AIP appear at a later date. (It is not unusual for a patient to excrete normal levels of ALA and PBG between acute attacks). The third member of the latter group was not tested.

"Our work demonstrates the value of studying families of patients with AIP."

Both interesting and practical, the project of Arthur H. Parsons (fourth year), who worked in association with Dr. Paul Landrigan, will have immediate application in the teaching of clinical medicine.

"Just as vision may be extended for teaching purposes by films and slides, so may hearing be extended by recordings done on tape or disc. Since auditory sensations play such an important part in educational programs, it is curious that this extension of hearing has not been more widely used in medical schools.

"There are sounds that every physician must recognize, and present high fidelity methods of recording make it possible to capture these sounds faithfully as an aid to study. The American Heart Association has pioneered in this field, but beyond their series of high fidelity recordings of heart sounds little attention has been devoted to this aid.

"Since Laennec's rediscovery of mediate auscultation this aid in physical diagnosis has become important in pulmonary disease and indeed the stethoscope has become a symbol of medicine itself.

"There is scarcely a second year medical student who would not welcome a better description of a rale or a more senior student who would like to be sure he has heard what his instructors heard as a pleural friction rub. For this reason, it was decided that a catalogue of tape recordings of breath sounds should be produced for teaching purposes here at Dalhousie.

"Verbal descriptions of the classical types of breath sounds were obtained and the wards of the Victoria General Hospital were combed for patients exhibiting these signs which were then recorded on a master tape and transferred to continuous loops which can be used on most tape recorders."

For the past two years Frederick Todd (third year) has been conducting extensive research on erythrocyte glucose-6-phosphate dehydrogenase deficiency in the Negro population of Nova Scotia. Calvin MacCallum, a first year student, joined the project this summer. The study was under the direction of Dr. Langley.

"Glucose-6-phosphate dehydrogenase (G-6-PD) is the first enzyme in the hexose monophosphate shunt of erythrocyte metabolism. G-6-PD deficiency is a genetically determined intracorpuscular defect which, under certain conditions, is associated with a hemolytic anemia. The deficiency is inherited as a sex-linked recessive. The ingestion of certain drugs (e.g. primaquine, sulfonamides, salicylates and others) and infections stress the erythrocyte, producing hemolysis. Nova Scotia has approximately 37 per cent of the Canadian Negro population or 11,900 individuals, according to the 1961 census. The incidence of G-6-PD deficiency was determined by employing the brilliant cresyl blue reduction test of Motulsky and Campbell-Kraut. The frequency of affected males was found to range from as low as 2.2 per cent to as high as 27.1 per cent in different Negro communities. Random genetic drift appeared to be responsible for the variation. Investigation showed that deficient males had G-6-PD activity averaging 9 per cent of normal. Starch gel electrophoresis revealed a fast A- type enzyme compared to the normal slow B+. Biochemical studies showed abnormalities in the Michaelis Constants (Km) for glucose-6-phosphate and 2-deoxy glucose-6-phosphate. The qualitative enzyme deficiency is similar to that found in about 10 per cent of American Negro males. Although the hemolytic anemia may be severe, it is self-limited. The condition does not appear to be associated with increased mortality. The high incidence of G-6-PD deficiency in Nova Scotia Negro communities emphasizes the importance of considering it in related clinical problems."

James E. Hickey (fourth year) assisted Dr. Vincent Ing, of the Hematology Department, with his personal research project. They were immediately concerned with studying the correlation between active body mass and total red cell mass, both in normal controls and in quadriplegics.

"The research program was directed towards ascertaining the correlation between active body mass and total red cell mass, with a view to studying the effect that body wasting has on the total red cell mass. It is postulated that there is a linear relation between red cell mass and total active body mass, that is, that red cell mass is more a reflection of total active body mass rather than body weight.

"To test this hypothesis, it was decided to study specific values in a group of normal controls and compare these values with similar results from a group of post-traumatic quadriplegics. The specific determinations done on each subject were:

1. total active body mass; 2. red cell volume; 3. plasma volume; 4. total body water. The desired volumes were analyzed using radioactive isotopes.

"The above mentioned studies were completed on a number of normal controls and quadriplegics, and these data were added to the subjects previously studied during the past year. To date, the calculations are incomplete but results are available regarding red cell mass and active body mass.

"As expected, the data show a constant ratio of red cell mass to active body mass and this is significantly better than the ratio of red cell mass to body weight.

"Another aspect to this study was the investigation of the effect of ovarian hormones on erythropoiesis. It is known that high doses of estrogens depress erythropoiesis in animals. In this study it was shown that the ratio of red cell mass to active body mass in the female was the same as in the male. This suggests that there is no appreciable influence of ovarian function on erythropoiesis in the human female as measured by these methods.

"As far as the quadriplegic subjects are concerned, it was found that the ratio of red cell mass to active body mass was considerably higher than expected. In quadriplegics it is known that active body mass, in the form of muscle, decreases secondarily to disuse atrophy. One would hence expect a corresponding decrease in red cell mass. This was not shown, however. The explanation may be that active body mass which does not decrease in quadriplegia (active non-muscle mass) requires more units of red cells per tissue cell than the muscle mass."

Also working in the Department of Hematology, Allen C. Eaves (fourth year) observed Na^{22} flux in old, young, and fetal red blood cells.

"Fluxes of radioactive sodium (Na^{22}) across red cell membranes have been studied in a number of pathological conditions as well as in normal cells. However, movement of sodium has not been compared in young and old cells, nor has it been studied

in fetal cells. A method of differential centrifugation was used to obtain a six-fold enrichment of old and of young cells, as verified by Fe^{59} labelling **in vivo**; cord blood, obtained at birth, was used for the fetal cell studies. Cells were suspended at 37°C in an isotonic solution containing 140 mM NaCl, 6.0 KCl, 0.3 mM Na2HPO4, 23 mM Tris buffer (pH 7.4), and approximately 0.376 microcuries/ml of $Na.^{22}$ At 15 min. intervals duplicate aliquots of 0.25 mls each were taken, spun down, the supernatant removed, and then washed 4 times with isotonic $MgCl_2$. After 6 aliquots had been obtained, the remaining incubated cells were spun down, the radioactive supernatant removed, and pre-warmed incubation medium without Na^{22} added to them. The efflux of the intracellular Na^{22} from the labelled cells was then followed by again taking 0.25 ml aliquots and washing the cells as before. The washed cell pellet from each aliquot was hemolysed with 2ml of distilled water and counted in a Nuclear-Chicago well-type gamma counter. The hemoglobin concentration in each aliquot was obtained and used to calculate the counts/min./cell for each 15 minute interval. A semilog plot was then used to obtain the slope of Na^{22} influx and efflux and this value was employed as a measure of the rate of sodium movement across the cell membrane. No significant difference in Na^{22} flux between young and old cells, nor between fetal and control cells could be found, despite the known differences among these cells of cell volume and surface area."

More mistakes are made by not looking than by not knowing. —Edward Jenner

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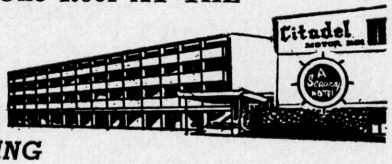

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