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**SESSION 10C - Radioactive Isotopes and Nuclear Radiations in
Medicine (concluded) Diagnosis and Studies of
Disease**

By

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Session 10C, "Radioactive Isotopes and Nuclear Radiations

in Medicine (concluded) opened promptly at 14:30 with Dr. M. Tsuzuki
presiding. Dr. Tsuzuki's opening remarks concerned only directions
to speakers. He then introduced Dr. A. Baird Hastings (USA) who read
his own paper, P/178 "The Uses of Isotopes in Biochemical and Medical
Research" and then P/840 "The Uses of Isotopes in Analysis of
Metabolic Disorders" by DeWitt Stetten, Jr.

Dr. Hasting's paper covered, as the title indicates, an
enormous field and, in the time allotted, he could no more than list
important contributions isotopes have made in Biochemistry and Medi-
cine. He did, however, elaborate in more detail his own recent
researches on the mechanism of action of insulin on glucose metabolism
using carbon 14. He concluded that "the diabetic state is one in
which there is both diminished glucose utilization and increased
glucose production--the former lesion being the result of diminished
ability of the peripheral tissues to phosphorylate glucose, the latter
lesion being the result of an increased ability of the liver to split
glucose-6-phosphate. The effect of insulin on muscle is a prompt,
direct one--but on the liver, its effect is delayed and indirect."

The paper by Stetten was also of review character, summarizing
the results of Stetten and collaborators and of others on three metabolic

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disorders: (a) the origin of uric acid in gout, (b) the origin of urinary creatinine in muscular dystrophy, and (c) the metabolic defects in diabetes.

Hastings finished promptly and the chairman introduced B. A. Burrows (USA) at 15:03 who presented P/180 "The Use of Radio-sodium and Radiopotassium Tracer Studies in Man" by Burrows and J. F. Ross.

This paper was concerned with the metabolism of sodium, potassium, and sulfate distribution in body fluids in patients both pre- and post-operative. Using radioisotopes, the distributions of sodium and potassium between extracellular and non-extracellular phases were determined by serum sampling at appropriate intervals following intravenous administration of the tracer dose of the isotope. Simultaneously, isotope dilution measurements of the body potassium which is chiefly intracellular can be made to determine changes in the ratio of body sodium to body potassium as well as changes in body potassium alone.

It is not surprising that Hasting's two reviews of high quality and of already published work drew no comment or questions, but one might have expected some questions on Burrow's paper which included preliminary and unpublished methodology. However, when Tsuzuki called for discussion there was no response from the floor.

The first of the next group of papers was P/447, "The Absorption of Vitamin B₁₂ and the Pathogenesis of Vitamin B₁₂ Deficiency" by Mollin and Smith (UK) read by Smith. This was a report

of a series of studies on human subjects using vitamin B₁₂ labeled with radioactive cobalt.

Cobalt⁵⁸, which has a half life of 270 days, can be used in patients with safety in amounts up to 5 microcuries. The labeled vitamins are made biosynthetically by small scale fermentations in an almost cobalt-free medium. Patients suffering from various types of anemias were given labeled vitamin B₁₂ and its absorption and utilization studied.

The second paper, P/711, "The Application of Radioactive Isotopes to the Study of the Biochemistry of Muscles" by D. L. Ferdman (USSR) was read by E. E. Kavetsky; this did not live up to its inclusive title. Actually a few preliminary experiments on the incorporation of P³² labeled phosphate and radio sulfate in a number of metabolites of normal and dystrophic (E-deficiency) muscles were described. The last paper, P/921 (India), "The Synthesis of 4:4 Diaminodiphenyl Sulphone S³⁵ and its Use in Leprosy Research" by P. Saraiya et al was read by V. R. Khanolkar. This paper was primarily a description of histological results. Apparently the authors had hoped to have radioautograms of the histological distribution of the labeled drug but were unable to obtain good pictures in time for the Geneva Conference. The Chairman then opened the discussion which proved to be quite revealing.

P/447 (UK) drew several questions concerning whether or not the authors had any evidence to indicate their measurements of radioactive cobalt were true indications of the intact vitamin B₁₂.

The authors had no such evidence and the whole study was therefore open to some question as to its validity. Specifically, Dr. Clark asked Dr. E. Lester Smith (P/447) if he would define "loop syndromes". Dr. Smith replied that he was not the medical partner of the team, but he understood a loop syndrome to be a fluid intestinal diversion or loop. Mr. Cheokud (Thailand) asked Mr. Smith (P/477) whether or not they had measured concurrently the CO^{58} and biological activity of B_{12} in the feces so as to determine whether or not the labeled B_{12} had undergone metabolic change or, worse, exchange. Mr. Smith pointed out that it is not easy to measure this as B_{12} is synthesized in the gastrointestinal tract. Using B_{12} labeled with both cobalt⁵⁸ and phosphorous³² they have evidence that B_{12} is not degraded to any extent in the digestive tract. Dr. Ross asked Dr. Smith if they had made any studies on the absorption of vitamin B_{12} across the respiratory epithelium. Dr. Smith said they had not made such experiments, but that it would not be unreasonable to expect the vitamin to be adsorbed by this pathway.

P/711 (USSR) drew one question and one comment. The question: what would be the influence on the observed results if labelled phosphate entry into the muscle cells (which is the result of metabolic processes) were altered in the dystrophic state? As the result of evasiveness or a poor translation, Kavetsky made a few remarks about the fact that blood levels of radiesulfate were compared! Mawson of Canada commented on the fact that the Russian authors had drawn conclusions concerning rates of metabolic activity from a

single time point after administration of isotopes. Such observations Mawson stated were meaningless! (True enough!) This question and this comment, though somewhat brutal, properly placed the research in perspective: it was amateurish and meaningless. P/921 was not commented upon. At this point Tsuzuki turned over the chair to Munez.

The next group of papers consisted of two: P/224 (USA) "The Utilization of Nuclear Energy in Public Health Problems on the Epidemiology of Communicable Diseases" by D. W. Jenkins read by the author and P/140 (Brazil) "A New Radioactive Method for Marking Mosquitoes and its Application" by M.B. Aragao read by J. Costa-Ribeiro.

Considering the last paper first, it involved neither a new method nor an advantageous one. The general subject had been well covered by the exhaustive review given previously by Jenkins P/224 (USA). This was a general review paper covering the following subjects: disease transmission by vectors, relation of animal hosts and parasites, insecticide and natural control of vectors, radiation control of vectors and diseases, studies on air-borne and water-borne diseases. Jenkins said that the use of nuclear energy in studying the epidemiology of communicable diseases offers an extremely promising and fertile field to epidemiologists and other investigators. Additional discoveries of major importance in the field of health can be expected.

The last two papers of the session were opened for discussion by the Chairman. Dr. Bugher asked D. Jenkins to comment concerning the application of these methods to tsetse fly control for hypanocmisses and anopheles control for malaria. Dr. Jenkins pointed out that there are several ways of using radioisotopes for studying tsetse fly control. One of the Russians commented favorably on Jenkin's paper and asked about the possibility of labeling bacteria and how such labeled bacteria could be used to solve epidemiological problems. Dr. Jenkins said that bacteria had been labeled and pointed out a number of ways labeled bacteria have been used in epidemiological studies. He said that time did not permit going into this in detail. Dr. Gopal-Ayengar (India) asked Dr. Jenkins if work had been done on the spread of allergins by using radioisotopes, (2) the metabolism of tubercle bacillus using isotopes. Jenkins said some work has been done following the spread of pollen from plants that had been fed radioisotopes. Jenkins referred to some of the papers cited in his manuscript in reply to the other questions. Dr. Jenkins asked Dr. Costa-Ribeiro of Brazil regarding plans they have for continuing the disposal of anopheles mosquitoes. Dr. Costa-Ribeiro said he did not have the information as he was not working on this problem.

The acting chairman Nunez closed the meeting on schedule.

As a whole, the meeting suffered from poor programming. A variety of unrelated subjects were considered and, while some papers were very general reviews, others were progress reports.