Estimation of Digestion in vivo in Man Using Labeled Food Materials

K. Okuda, I. Takara, T. Nikaido, T. Kitasaki and M. Takamatsu

The Second Department of Internal Medicine, Kurume University, Kurume

The nutritive value of food has in the past been estimated from its chemical composition, but it is also related to digestibility which has not been determined in vivo. It is impossible to reproduce in test tubes, the same digestion process as occurs in the G.I. tract. Certain food-stuffs are poorly digested and therefore low in nutritive value in spite of the high contents of good nutrients.

Theoretically two methods may be feasible. In Method I, a tracer is incorporated into a food-stuff, preferably in its native state, if not, in such a way that it is not readily extracted. From the chemically determined total content of the marker and the absorbed radioactivity, digestion is calculated. Method II can be used when % absorption of the tracer dose is precipitously decreased when isotopically diluted by the same but cold material liberated from food. This so-called diluting dose can be the native content of food, or can be artificially added. Gamma emitters which are bound to protein in food or to the supportive structure of the food, and are absorbed completely or to a consistent extent suit the purpose.

First, attemps were made with ^{59}Fe by incorporating it into various food items and feeding them to humans. It was found to be unsuitable. ^{57}Co-cyanocobalamin was tried and found to be usable because its absorption is well documented with regard to dosage, easily measured from urinary analysis, and the percentile absorption drops sharply with increasing doses between 0.2 and 8 ug.

^{57}Co-cyanocobalamin was incorporated into hen eggs by injection to laying hens, and into rat and chick livers repeated injections. When fed to human volunteers and absorption was measured by Method I, liver was found to be digested almost completely, while egg yolk was hard to digest, being digested to the extent in the neighborhood of 20%. Free ^{57}Co-cyanocobalamin was added to rice, gello, egg white and yolk, agar, ice cream mix, etc. before cooking or preparation, they were fed and digestion (liberation of ^{57}Co) was estimated. The result indicated that rice, pudding, agar, and ice cream were well digested while cooked eggs were poorly digested. If mixed with beef steak and fed to human volunteers, digestion or liberation of cold B_{12} from steak became poorer with increasing amounts fed. ^{35}-labeld thiamine was also used in a similar manner and found to be of some value in the estimation of food digestion because of the consistent absorption in the dose range 0.2 mg.

We are presently in the pursuit of other gamma emitters or radionutrients including metals which short biological half lives that are well absorbed.

Evaluation of the Pancreas Dynamic Images Using Scintillation Camera

T. Hiraki and K. Hisada

Department of Radiology and Nuclear Medicine, School of Medicine, Kanazawa University, Kanazawa

Because of rapid imaging capability, scintillation camera enables us to make serial exposures of the pancreas. And scintiphotos can be obtained before and after changing the posture either supine or upright trunks to flexibility of camera detector.

The following points of scintiphotos considered to be superior to a conventional scan-