

A Fast and Reliable Method for Determining Dietary Fat Absorption

TECHNICAL FIELD

Diagnostic: Fat absorption or malabsorption (2003-0508)

BACKGROUND

Chronic undernutrition resulting in significant weight retardation and linear growth failure has long been recognized as a general problem in several patient populations. It is well accepted in medical science that there is a significant correlation between the degree of malnutrition, the severity of such diseases, overall energy imbalance, and malnutrition that manifests in malabsorptive conditions. Fecal nutrient losses from maldigestion or malabsorptive diseases are known to contribute to energy imbalance and point to the need for a convenient and accurate measure of fat absorption to improve diagnosis, management and treatment of these conditions. A fat-balance methodology which is based on the measurement of consumed and excreted fat is a standard means for the assessment of the absorption of dietary fat. Such a methodology however, can be difficult to execute accurately and can be an onerous task, as well as difficult to verify and complete. The use of radio-labeled markers has been attempted; however, tests obviously require ingestion of radioactive material, a procedure that has inherent limitations and can have serious drawbacks for human subjects. Non-radioactive safe markers that are measured by standard techniques have not been validated. Currently, there are no known markers that are both safe and readily available for use in humans or methods for the use of such a marker. Therefore, a need exists for an appropriate marker for dietary fat that: (1) is not absorbed; (2) has the physical properties of dietary triacylglycerol fats; (3) can be measured by standard gas chromatographic techniques; (4) is approved for use in humans; and (5) does not alter dietary fat absorption. Such a marker would also need to be readily available in sufficient, cost-effective quantities. Therefore, a method that would allow measurements to be taken from relatively small samples at appropriate times would relieve all parties of the burden of extensive collection and storage of fecal materials.



TECHNOLOGY

The current invention is a composition used as a test meal comprising a predetermined amount of dietary fat and a predetermined amount of a non-absorbable fat marker, such as a sucrose polyester in the form of sucrose behenate. The method for measuring total dietary fat absorption by the digestive tract of a subject comprises the steps of administering ingestion of the test meal by the subject, collecting a sample of fecal matter at an interval following ingestion of the test meal, measuring the amount of the non-absorbable fat marker recovered in the fecal sample and calculating the amount of dietary fat recovered from the test meal to determine the amount of dietary fat that was absorbed by the digestive tract of the subject. The methods of the invention can be used to diagnose malabsorption of dietary fat by the digestive tract of a subject or impairment of dietary fat digestion. The advantage of this current invention over existing tests is that patients may take only one test and only a single "marked" stool sample is required for analysis to determine the ratio of fat to marker in the stool and by comparison to the same ratio in the test meal, calculate the fraction of fat absorbed from the test meal. Sucrose behenate is an excellent marker for this purpose because it is currently consumed in food, is completely excreted, is handled by the G.I. tract as are normal dietary fats and is readily measurable by gas chromatography. Thus, this method provides a rapid and easy assessment of dietary fat absorption and avoids the cumbersome and laborious process currently in use.

Investigators are currently nearing the completion of a study to compare the method with the quantitative fecal fat measurement in cystic fibrosis and have completed studies evaluating the sucrose behenate method against the quantitative fecal fat method in overweight adults taking Orlistat.

APPLICATIONS

1. Assay to determine fecal fat for the purpose of determining fat absorption or malabsorption
2. Research tool

ADVANTAGES

1. Analysis requires only 1 test meal
2. Marker is:
 - Consumed in food
 - Completely excreted
 - Handled by GI tract like normal dietary fats
 - Readily measured by gas chromatography

INVESTIGATORS

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STATUS

Patent applications pending.

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A Fast and Reliable Method for Determining Dietary Fat Absorption

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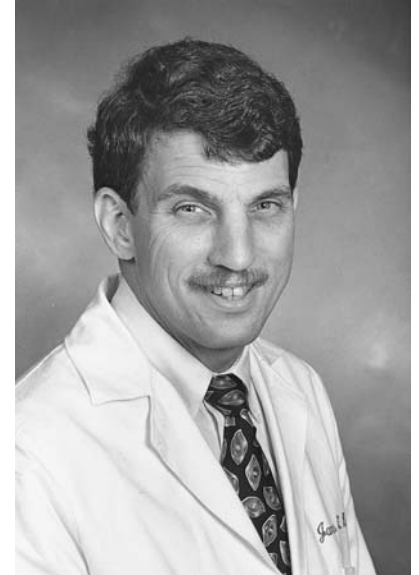
BACKGROUND

MD: Indiana University School of Medicine, Indianapolis, IN, 1973.

Residency: Pediatric Residency, James Whitcomb Riley Hospital for Children, Indiana University, Indianapolis, IN, 1973-1975.

Fellowship: Pediatric Gastroenterology and Nutrition, Children's Hospital Medical Center, Cincinnati, OH, 1975-1978.

Certification: Pediatric Gastroenterology and Nutrition, 1990.



James E. Heubi, MD, has been a practicing pediatric gastroenterologist since 1979, when he joined the staff at Cincinnati Children's Hospital Medical Center. Dr. Heubi's practice includes the treatment of all disorders affecting the gastrointestinal tract, liver and biliary tract, and pancreas. Areas of practice interests include liver disease and complications related to end-stage liver disease and liver transplantation and the management of patients with "short gut" or compromised gut function requiring prolonged enteral or parenteral nutritional support.

Dr. Heubi's research interests focus on the following areas:

- Cholesterol absorption
- Cholesterol metabolism
- Inborn errors of bile acid metabolism
- Bone metabolism in health and disease
- TPN-related cholestasis and its treatment

In addition to being the Director of General Clinical Research Center at Cincinnati Children's, Dr. Heubi is also the Associate Dean for Clinical Research at the University of Cincinnati College of Medicine.

Dr. Heubi was awarded "2004 Best Doctors" and "2005 Best Doctors".