From Clinical Chemistry to Food Chemistry: the Pennington Experience

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Pennington Biomedical Research Center (PBRC) is a relatively new research center dedicated to nutritional research and education with the goal of improving human health. The center was the result of a multimillion dollar gift by C.B. "Doc" Pennington for the purpose of nutritional research. The Center has been open six years and is continuing to grow. It is the goal of the goal of PBRC to become an internationally recognized facility for the performance of nutritional research.

The Clinical Research Laboratory at Pennington opened in 1989 with the purpose of serving as a support laboratory for the clinical and basic research being conducted, as well as for the U.S. Army Institute of Environmental Medicine's nutritional research studies. The laboratory has performed more than 200,000 tests on a least forty different studies. The laboratory operates using the principles of quality control, quality assurance, and good laboratory practice. Modern automated equipment is used to improve precision and accuracy and minimize analyst to analyst variability often found when using manual methods. Quality control procedures include routine checks of refrigerator/freezer temperatures, water purity, pipet accuracy and precision, reagent reliability, and instrument maintenance. Daily monitoring of quality control and periodic checks using interlaboratory comparisons, reference materials, and external quality control surveys help to insure the accuracy of results. The laboratory is in the process of being accredited by the College of American Pathologists.

It was recently determined that the addition of a food analysis laboratory at PBRC would facilitate and support clinical research being conducted at the Center. The establishment of this laboratory gave PBRC the capability to design menus for feeding studies using the in-house MENu (Moore Extended Table of Nutrients) database, and to verify those diets by direct analysis. The lab also gave MENu the capability to verify published data on nutrient content of food and to act as a research tool in support of the Metabolic Kitchen.

In setting up a food analysis laboratory it soon became apparent that some of the principles from the clinical laboratory were less easily transferred than we initially thought. Several problems in food analysis became evident very quickly: 1) sample processing is laborious and time consuming, 2) there are multitudes of sample matrices, and 3) there is a scarcity of reference materials. Despite these problems, we have, we believe, successfully implemented a highly automated, modern laboratory using the principles of quality control and quality assurance.

Equipment, which was generously purchased by the Pennington Medical Foundation, is now operational and includes those instruments listed in Table 1.

Table 1. Equipment Purchased for Food Analysis Laboratory

Instrument	Function
Soxtec	Fat Extraction
Fibertec	Fiber Analysis
CEM Microwave Moisture	Moisture Determination

CEM Microwave Muffle Furnace	Ashing
Perkin Elmer Nitrogen Analyzer	Nitrogen Analysis
two Hewlett Packard GCs	Cholesterol and Fatty Acids
two Waters HPLCs	Vitamins and carbohydrates
UV Visible Spectrophotometer	General Lab Analyses
Hewlett Packard Capillary Electrophoresis System	Anion Analysis & Experimental Studies
Robot Coupe R4	Sample Prep
Robot Coupe R10	Sample Prep
Waring Blender	Sample Prep
Homogenizer	Sample Prep
Perkin Elmer 5100Z Atomic Absorption Spectrophotometer	Trace Elements
Perkin Elmer 1000P ICP	Minerals

The Food Analysis Laboratory at PBRC is located in the main laboratory building in one of the sixteen basic research labs. The lab, which is 700 square feet, is equipped with stainless steel counters and a seamless acid and solvent resistant vinyl floor which is well suited for food analysis. The location of the Food Analysis Laboratory makes it accessible to shared facilities at PBRC. These facilities are the Liquid Scintillation/Gamma Counter lab, walk-in incubator, ultra centrifuge lab, walk-in refrigerators and freezers, the Clinical Research Laboratory, and Central Stores.

Analytical methods that are used in the Food Analysis Laboratory are official methods such as the American Association of Official Analytical Chemists (AOAC), American Association of Cereal Chemists (AACC), American Oil Chemists Society (AOCS), United States Department of Agriculture (USDA), and in-house methods which will be validated accordingly. We will perform the same quality control, quality assurance, and good laboratory practices which are also used in the clinical laboratory.

In addition to supporting the Metabolic Kitchen and the MENu database, we will be able to perform food analysis and research for the U.S. Army. Plans are underway for the lab to serve as a training ground and research facility in conjunction with the graduate program of the Food Science Department at Louisiana State University. Other goals are for this laboratory to obtain external funding, provide quality service, and become a world class laboratory.