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Cooperation between the Clinical Laboratory and the Dietician: Keeping Track of Sodium in Low-Sodium Diets

To the Editor:

Low-sodium diets are commonly prescribed in the management of various cardiovascular diseases. In preparation for an evaluation of the effects of drugs on people on low sodium diets, we evaluated the ability of a 468-bed community hospital to provide low-sodium diets. Homogenates of individual foods and whole meals were analyzed by flame photometry after nitric acid digestion. The digestion was a modification of the method of Hulet (1).

The details of the analysis are as follows. All liquids are filtered through Evergreen No. 3045 filters and analyzed directly. The food or meal is weighed to the nearest hundredth of a gram on a single pan, top-loading balance, and the weight is recorded. The sample (except for fats or oils as single items) is transferred to a blender. Sufficient doubly-distilled water (usually equal to the weight of the sample but not greater than twice the weight of the sample) is added, to give a uniform homogenate. The volume of water added is recorded. In the case of meals that include a beverage, addition of water may not be necessary.

Two 30-g samples of homogenate or fat or oil are weighed into two 250-mL Erlenmeyer flasks and the weights are recorded. The remainder of the homogenate may be stored in the freezer until the test is completed.

Thirty milliliters of concentrated nitric acid, analytical-reagent grade, is added to each sample in the Erlenmeyer flask. Proper safety precautions must be taken. The mixture is slowly heated to boiling on a hot plate in a hood. The heating is continued until the solution is free of solids. A trace of solids may remain in a few cases.

The solutions are allowed to cool, then transferred to 100-mL volumetric flasks and diluted to volume with doubly-distilled water. A portion of the solutions are filtered through Evergreen No. 3045 filters and used for sodium and potas-

sium analysis by flame photometry. Flame photometry for sodium and potassium, with use of an internal lithium standard, is performed by the manufacturer. We used an Instrumentation Laboratory Model 143 flame photometer and a Model 144 dilutor.

Values received from flame photometry are in milliequivalents per liter (mEq/L). They are converted to mEq/g of food or mg/g of food as follows:

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\text{mEq(L)/(1000 mL/L)} = \text{mEq/mL in solution in the volumetric flask}
\]

\[
= \text{mEq per aliquot of homogenate}
\]

Total weight of homogenate

\[
= \text{wt. of sample + wt. of water added}
\]

\[
= \text{mEq(g/aliquot)/(g/aliquot)}
\]

\[
= \text{mEq per total homogenate}
\]

\[
= \text{mEq/g of total homogenate} \times g \text{ total weight of homogenates}
\]

\[
= \text{mg of sodium per gram of sample}
\]

The results for diets being prepared by the kitchen indicated amounts of sodium exceeding those indicated by the literature (2). This initiated a search for the source of the error.

Analysis of the kitchen tap water over a 15-day water-softener cycle showed that the sodium concentrations remained relatively constant. The soft-water sodium concentration in hot water averaged 8.90 ± 0.27 mEq/L, in cold water 1.38 ± 0.34 mEq/L. Foods that might be expected to exchange water were cooked in cold tap water and distilled water. The tap-water-cooked food averaged 1.58 times the sodium and 0.72 times the potassium of the food cooked in distilled water. The sodium and potassium content of the distilled-water-cooked food approached the literature values (2).

Besides the excess sodium from the water, excess sodium was found in some prepared meats and some drinks with vitamin C added. It is believed that monosodium glutamate in the tenderizer is the source of the problem with the meats and sodium ascorbate is the source of the problem with the drinks.

By cooking with distilled water and using laboratory values for sodium in the food, 10-mEq and 100-mEq diets were achieved. Analysis of homogenates of whole meals was adequate to monitor sodium intake and assured that the diets were within ±10% of the desired value.

To evaluate these diets in man, four normal outpatient volunteers were fed the two diets, with distilled water to drink between meals, for 10 days. They received the 100-mEq diet 10 months after the 10-mEq diet.

On the 10-mEq diet, their average urinary sodium excretion dropped to ~2 mEq/d. They average body weight decreased by about 2.7 kg, and their urine volume decreased by about 500 mL. On the 100-mEq diet, their average sodium excretion was ~15% less than their intake, their average body weight decreased about 0.9 kg, and their urine volumes remained relatively constant. Sodium excretion was a good indication of compliance. These results agree well with the literature (3).

Quality control of low-sodium diets can be achieved and maintained with monthly or quarterly analysis of homogenates of whole meals. This is an easy analysis for the clinical laboratory to add, and it should be added where low-sodium diets are an important part of patient treatment. Such cooperation between laboratory and dietician will improve patient care.

References


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Properties of Different Gel-Filtration Systems Used for the Purification of 125I-Labeled Bovine Parathyrin

To the Editor:

Difficulties in obtaining a suitable purified tracer are among the main drawbacks in measuring parathyrin in human serum by radioimmunoassay (1, 2). We have compared different gel-filtration systems for the purification of the radio-iodinated bovine parathyrin (125I-bPTH).

The hormone (bPTH, lot C001; Ino-
ex, Chicago, IL) was labeled according to Greenwood et al. (3), with some modifications. The bPTH/iodine ratio was 10 μg to 1 mCi, and 10 μg of Chlor-

amine T was used. After 15 s, the reaction was stopped with 125 μg of Na2S2O5.

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