

# Physician Knowledge of Sodium Content of Common Foods

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Knowledge of sodium content of common foods was secured from 49 physicians attending a family practice review course, 91 persons attending a health sciences open house, and 6 dietitians. Although physicians reported they commonly provide advice on sodium restriction, their scores (mean, 6.4 of 14 correct) were comparable to those of the general public (6.0). As expected, the dietitians' score (10.3) was higher. No difference in physician score with years of practice experience was detected. Several actions to remedy this apparent deficiency in physician knowledge are suggested.

Nutritional management of disease states is an ancient and time honored practice. Recently increasing attention has been given to dietary therapy, as public interest in "natural" means of disease prevention and alleviation has grown along with increased awareness of iatrogenic maladies resulting from pharmacologic and technologic interventions. However, while the public continues to view physicians as competent providers of nutritional advice, there is doubt about whether physicians do in fact have adequate dietary knowledge.<sup>1</sup> Most studies to measure nutritional competency have dealt with medical students and have found serious deficiencies.<sup>1-3</sup> It has been suggested that practicing physicians gain nutritional knowledge during the first few years of practice,<sup>2</sup> but studies of hospital care by experienced physicians indicate continuing needs.<sup>4,5</sup> Only one study comparing medical students and physicians has been reported, which showed an only modestly higher level of nutritional knowledge by the physicians.<sup>6</sup>

Despite apparent lack of training, a majority of primary care physicians do provide nutritional advice to their patients. Modrow et al<sup>7</sup> found that

81 percent of family physicians surveyed provided nutrition information in their practice. Although dietary counseling by a nutritionist is often also available, the primary care physician, with a longstanding, continuing relationship with the patient, is in a more advantageous position to offer long-term follow-up and continuing evaluation.

This study evaluates the knowledge of practicing family physicians regarding one common dietary topic: the sodium content of foods. Physician knowledge is compared with that of dietitians and the general public. A relationship of physician level of knowledge and number of years in practice is explored.

## Methods

Participants at a week-long family practice review course were asked to complete a brief anonymous questionnaire inquiring about their training and nutritional counseling methods. The questionnaire also contained 14 questions related to the sodium content of common foods. These questions were of two types (Figure 1). In the first six, physicians were asked to choose which of a pair of items has the higher sodium content. In each pair, one item has at least twice as much sodium as the other, and in three of the six pairs, the higher item has four or more times as much sodium as the

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In each of the following pairs, one item has at least twice as much sodium as the other. (All quantities are reasonable sizes for a single portion.) Please check the one with the *most* sodium for each pair.

- |   |  |
|---|--|
| 1. <input type="checkbox"/> 1 Heinz Dill Pickle                 | 4. <input type="checkbox"/> 1 half cup Jello Chocolate Pudding |
| <input type="checkbox"/> 4 slices of Oscar Mayer Bacon          | <input type="checkbox"/> 1 can beer                            |
| 2. <input type="checkbox"/> 1 oz Lay's Potato Chips             | 5. <input type="checkbox"/> 1 cube instant bouillon            |
| <input type="checkbox"/> 1 "Big Mac"                            | <input type="checkbox"/> 6 saltine crackers                    |
| 3. <input type="checkbox"/> 1 serving Wishbone Italian Dressing | 6. <input type="checkbox"/> 1 oz Kellogg's Corn Flakes         |
| <input type="checkbox"/> 1 oz Planter's Cocktail Peanuts        | <input type="checkbox"/> 1 slice Pepperidge Farm white bread   |

Please check your estimate of the sodium content of each of the following:

	<400 mg (<18 mEq)	600-900 mg (26-39 mEq)	>1100 mg (>48 mEq)	
7.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	6 oz broiled round steak
8.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1 can (7.5 oz) Chef Boy-ar-dee Beefaroni
9.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1 Swanson Frozen Fried Chicken Dinner
10.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	3 slices Oscar Mayer Bologna
11.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1 "Big Mac"
12.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1 oz Lay's Potato Chips
13.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1 teaspoon soy sauce
14.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	1 oz Planter's Cocktail Peanuts

Figure 1. Sodium content questionnaire presented to participants. Question numbers were added later for clarity of discussion

lower. The last eight questions required the participant to rate a given food as low (less than 400 mg), medium (600 to 900 mg), or high (greater than 1,100 mg) in sodium. In the case of item 11 (Big Mac), the manufacturer's stated sodium content (960 mg) was found after the conclusion of the study to be less than that reported in the reference used to prepare the questionnaire,<sup>8</sup> in which the value was reported to be 1,510 mg. Therefore, either medium or high responses were accepted as correct for this item. One hundred eighty questionnaires were distributed, and 56 were returned. Registered dieticians from the University of Washington inpatient dietary service were asked to complete the same 14 questions without forewarning or references. Adult members of the general public visiting the health sciences open house at the University of Washington were given an identi-

cal list of 14 questions, except teaspoon quantities of salt were substituted for milligrams of sodium. Test scores were number of correct responses, with a maximum possible score of 14. Mean test scores were compared using Wilcoxon rank-sum test, and P values reported are all two-tailed.

## Results

### Physicians

Of the 56 respondents at the family practice review course, 49 were physicians. Nine of them were in residency training, 13 had been in practice for 5 years or less, 9 had been in practice for 6 to 15 years, and 13 had been in practice more than 15 years. The remaining five stated they were in prac-

**Table 1. Methods Employed by Physicians To Institute Sodium Restriction (n=49)**

Method Commonly Employed	Percent of Physicians*
General verbal advice	79
Written handout	54
Refer to dietician	35
Refer to nurse or educator	13
Prescribe a diet	6
*Total is greater than 100 percent because some respondents employ more than one method	

tice but did not specify the number of years. Three nurse practitioners and four who identified themselves simply as "other" also completed the form. Their results are not considered here, although their scores were similar to the mean of the physician group.

Table 1 shows the methods physicians stated they commonly employed to institute sodium reduction. General verbal advice was most frequent. About one third of the respondents commonly referred the patient to a dietician. Formal prescription of a diet by the physician was uncommon. All respondents answered affirmatively when asked if they would advise sodium restriction for a 40-year-old man on no medications with three consecutive blood pressure readings of 150/95 mmHg.

Table 2 shows the mean scores on the sodium content portion of the questionnaire for the physicians, general public, and dieticians. The mean score for the physicians (6.4 correct out of 14, or 46 percent) did not differ significantly from what would be achieved by a pure guessing strategy ( $6 \times 0.5 + 7 \times 0.33 + 0.67 = 6.0$ ). The highest score achieved was ten correct (71 percent). One-way analysis of variance failed to show any significant difference in score with years of practice.

The possibility that the last eight questions were unreasonably difficult was considered. However, in analyzing the first six questions separately, again the mean score for the physicians (3.1, SD 0.18) was not different from the expected results of chance guessing. Again, no relationship was seen between the number of years of experience and the level of knowledge.

**Table 2. Sodium Content Test Scores**

Group (n)	Mean Score* Range
Physicians (49)	6.4†
Residents (9)	6.7 2-10
Practiced 1 to 5 years (13)	6.4 4- 9
Practiced 6 to 15 years (9)	5.6 1-10
Practiced >15 years (13)	7.0 3-10
Practiced years unknown (5)	6.2 5- 8
General public (91)	6.0 2-11
Dieticians (6)	10.3 9-12
*Number correct out of 14	
†Physicians' mean score vs general public, P=0.14; physicians' mean score vs dieticians, P=0.0002	

All physicians placed item 11 (Big Mac) in the medium or high category, and thus were credited as correct; question 5 (correct for 68 percent) was the only other question correctly answered by more than two thirds of the respondents. Questions 12, 13, and 14 were each answered correctly by less than 15 percent of the respondents. The combination of questions 11 and 12 sought information similar to that in question 2. The responses to those three questions were internally consistent on all questionnaires returned by physicians.

The scores of physicians were also studied in association with the methods of counseling reported in Table 1. For each method, the scores of physicians employing it were compared with those not employing it. In no case were significant differences found, although it was of interest that the lowest mean score occurred among those who prescribed a formal diet.

### General Public

Ninety-one questionnaires were returned for the general public sample. Their mean score (6.0, Table 2) was slightly lower than that of the physicians but not to a statistically significant degree. The power was 0.82 for detecting a difference in mean scores of 1.0 at a 0.05 level of significance. The range of scores was also similar to that of physicians, as was performance on individual test items.

Sixteen of 78 (21 percent) general public respondents who answered the item stated they had been advised previously by a physician to decrease their sodium intake. The mean score of those 16 respondents was higher than that of those who had not been so advised, but not statistically significant (6.7 vs 6.0,  $P = 0.22$ ). Of 13 patients who said they were hypertensive, 10 had been advised previously to decrease dietary salt.

Six of 91 questionnaires (7 percent) were internally inconsistent in their response to questions 2, 11, and 12.

### *Dieticians*

The dieticians' mean score (10.3) was significantly higher than that of the physicians or the general public (Table 2). All six questionnaires were internally consistent.

## **Discussion**

This study shows that while practicing physicians commonly counsel patients about dietary sodium, their knowledge of sodium content is no greater than that of the general public. The "general public" control group was not a random sample but comprised individuals coming to the university to further their understanding of health related issues. They may well have had an above average interest in and knowledge of nutrition. It is likely, however, the physician group was similarly biased toward motivated individuals. They had come to Seattle during rainy season for a week-long continuing medical education course and were those participants willing to complete and hand in the questionnaire. Thus, while a selection bias is certainly present in the physician sample, it is unlikely their knowledge is below the average for primary care physicians.

The questionnaire does not appear to be unreasonably difficult. Several of the items were included because of common misconceptions about their sodium content. However, all foods in the questionnaire are commonly consumed, the differences to be distinguished in their sodium content are substantial, and high scores were achieved by dieticians. The dieticians in this study deal entirely in research or inpatient problems. They commented that dieticians involved in outpatient counseling would probably attain higher scores.

That both physician and general public scores were close to the value expected for pure guessing does not imply that respondents chose that method for completing the questionnaire. The internal consistency of the questionnaires was high. Analysis of individual questions showed the sodium content of several items to be commonly misperceived. Potato chips, soy sauce, and peanuts were consistently perceived as higher in sodium than is actually so. The sodium content of salad dressing was underestimated by more than half of both physician and general population respondents.

There were several reasons for selecting dietary sodium as the topic of this investigation. Indications for sodium restricted diets are numerous in ambulatory practice, including hypertension, congestive heart failure, renal failure, liver failure, and drug induced sodium retention.<sup>9</sup> Nutritional management of disease states including hypertension was ranked second in importance among 22 nutritional concepts evaluated by a multidisciplinary panel of experts.<sup>10</sup> The evidence supporting a relationship of salt and hypertension is particularly strong,<sup>11</sup> unlike many purported diet-disease relationships.<sup>12</sup> Also, modest dietary sodium changes have been found successful in reducing blood pressure<sup>13</sup> and do not have the adverse physiologic side effects of drug therapy. Thus, the information tested should be commonly valuable in patient care.

The test administered measured only a small portion of the knowledge needed to skillfully advise patients in sodium restriction. In addition to knowing the sodium content of foods, counselors must be aware of economic, cultural, and personal taste factors that enter into food selection. They must take into account the patient's other nutritional needs and must tailor any dietary prescription to the patient's quantitative abilities and interests. However, the information tested, while not sufficient, certainly is necessary for adequate counseling.

In agreement with previous work,<sup>7</sup> a large proportion of physicians stated they verbally offer advice on restricting sodium intake, while a minority refer patients to a dietician. Patients who had been advised by physicians (not necessarily the physicians of this sample) to decrease salt intake were not significantly more knowledgeable about sodium content.

**Table 3. Sodium Content of Selected Foods**

Item	Sodium (mg)*
1 Heinz dill pickle	1,428, 1,137†
1 Swanson frozen fried chicken dinner	1,173
1 can (7.5 oz) Chef Boy-ar-dee Beefaroni	1,111
1 Big Mac	963, 1,510†
1 cube instant bouillon	960
3 slices of Oscar Mayer bologna	876, 672†
4 slices Oscar Mayer bacon	452
1 half cup Jello chocolate pudding	404†
1 serving Italian dressing	293
1 tsp soy sauce	286
1 oz Kellogg's Corn Flakes	216, 350‡
1 oz Lay's Potato Chips	191†, 260‡
6 saltine crackers	198
1 oz Planter's cocktail peanuts	138
1 slice white bread	117
6 oz broiled round steak	76
1 can beer	25

\*Unless otherwise noted, source is Pennington and Church.<sup>15</sup> Specific brands were not always listed in this source. Alternate values given when values substantially differ  
†From *Consumer Reports*<sup>8</sup>  
‡From data manufacturer lists on product packaging

There was no evidence that physicians gain nutritional knowledge with years of practice. It is possible that the sample size was not large enough to show such a relationship. Also, perhaps recent improvements in medical school curricula have brought recent graduates to a level comparable to that gained with experience. Previously cited recent studies, however, showing continuing deficiencies in nutritional knowledge among medical students, make such a cohort effect unlikely. Therefore, it is concluded that practicing physicians at all levels of experience lack basic knowledge needed for adequate counseling about low salt diets.

Several actions should be undertaken to improve this situation. Innovative means of teaching nutrition have been shown effective. Dunphy and Bratton<sup>9</sup> provided sample meals to medical students at lunchtime lectures with good results. Such methods should be undertaken at all levels of medical education. Physicians not wishing to upgrade their own skills should more frequently consult dietitians or use patient education materials. Physician support of mandatory labeling of sodium content of processed foods should be continued to further awareness of salt content.<sup>14</sup> Finally, physicians providing dietary advice should periodically reassess their level of knowledge. For those readers who would like to assess their own knowledge of this small portion of nutritional science, answers to the study questionnaire are provided in Table 3.

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