A Perspective on Reducing Salt Intake

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Epidemiological, clinical, and experimental evidence links excessive salt consumption to hypertension; there appears to be no evidence that it is beneficial. I conclude that it should be public policy to advise and help Americans to reduce their salt intake. Because even mild hypertension increases risk, the overall problem does not appear to be amenable to treatment, although treatment for those with clinical hypertension will always be needed. There appears to be little likelihood that identification of those "at risk" will be successful, nor does it appear that we have the capacity at this time to conduct successful preventive field trials. It is difficult for the individual to modify his diet alone. The successful strategy is to modify the food supply by changing public demand. The public responds to dietary advice if acceptable and identifiable products are available. Because most of the salt is in commercially prepared foods and because their consumption will increase in the future, the major responsibility for lowering salt consumption will fall on the food manufacturers. They are beginning to respond, and there appears to be ample opportunity for them to reduce the salt content of foods markedly. Our temporary objectives, however, should be modest, because unrealistic objectives only discourage those who attempt to follow them. (Hypertension 1991;17[suppl I]:I-201–I-204)

There is a story of two men who came to a river and saw drowning people floating by. One tried as hard as he could to drag them ashore, but there were so many he could save only a few; the second headed upstream to find out who was pushing them in.

As I understand the evidence, any increase in blood pressure, whether at the individual level as in the Framingham data, or at the population level increases risk of cardiovascular disease. Thus, a very large proportion of Americans are at risk. This is not simply an aging phenomenon because it does not occur in some populations, but it must be due to environmental causes complicated by large differences in individual susceptibility. There is no way that traditional medicine—the physician, the patient, the pill—can deal with the situation.

We often hear how difficult it is to modify dietary habits. We know that this is true, but this difficulty entails changing the eating habits when there is relatively little guidance concerning the better choices and when others among and around them are consuming another diet. If we take a broader perspective, we can note the tremendous changes that have occurred in the American diet in the last few years. Modern food technology really developed after World War II; since then thousands of new foods have been introduced and continue to be introduced.

It is not that what Americans eat cannot be changed, but to successfully effect a change, the food supply must be modified. The foods we want people to eat have to be readily available, identifiable, and acceptable to the consumer.

The current food supply, however, is little more than a happenstance: it consists of whatever the various producers in the food chain can provide and sell at a profit, and it has developed with, for all practical purposes, no nutritional guidance or control. It surprises me that anyone would conclude that this is the best food supply we can achieve or that the American diet is somehow sacrosanct and should not be changed. However fragmentary our knowledge may be, there is every reason to believe that some planning is better than none at all.

So the first point is that the American food supply and what Americans eat can be modified. The food supply obviously responds to consumer demand, and consumer demand can be changed, as for example the increasing public awareness of fat and cholesterol in the past few years. Consumption of eggs, butter, and whole milk has fallen substantially, and even beef consumption has decreased. We are eating more vegetable oils, unsaturated margarines, low fat milks, and chicken. We should also recognize that we are only in the preliminary stages. For many years, much of the food industry thought they could ignore dietary recommendations such as the dietary guidelines of the US Departments of Agriculture and Human Services. Only in the last 2 years have the beef industry, for example, and agricultural producers in

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general decided that their products must reflect the consensus that lower fat and cholesterol consumption is desirable. What we must do is challenge the producers by modifying demand. This is happening now with regard to salt.

The second point I would make is that it is always easier to hide behind our ignorance and do nothing rather than do something. In fact, a decision to do nothing is just as positive and should require the same kind of evidence and thought as a decision to do something. We have heard the evidence. It is clear that there is substantial evidence that excess salt is harmful; we have heard nothing to indicate that high salt intakes are beneficial. A judge, given the evidence, cannot conclude that a decision is not possible (i.e., it is necessary to wait 20 years to assess the accumulated data). He has to make a decision based on the current evidence. All important policy decisions are made with inadequate evidence. Now that the salt issue is on the table, it needs and will receive an answer. The question should not be “Is a low salt diet for everyone?” The question should be “What is the desirable level of salt in the diet?” I have no doubt that the answer will be that Americans, as a whole, would be better off with a lower salt intake.

I would only note that the “desirable level” should also be looked at pragmatically. Most of the evidence would indicate that the true requirement of salt is very low, a level that certainly cannot be reached in the American diet anytime in the foreseeable future. Unrealistic recommendations serve no useful purpose, discourage people who try to follow them, and actually retard progress. Hence, the question should be modified to “What lower level of salt can we likely achieve?”

**Salt Sensitivity**

Obviously, there is great interest in salt sensitivity. Identification of those who are more or less sensitive would no doubt be helpful in trying to determine how the body copes with salt. Yet I see little, so far, that appears very helpful. In short-term tests some individuals show greater and lesser responses in blood pressure after a salt load is pre-

The correlation coefficient of the individual serum cholesterol responses in the two tests was statistically significant (r=0.4), indicating some consistency in response, but this means that only about 16% of the variance could be attributed to true individual differences. The cause of these differences in response from one time to the other is not known. My guess is that the reproducibility of tests of “salt sensitivity” may not be much better. If we are going to use such tests, I suggest that we make a serious attempt to ensure that they do, in fact, differentiate between individuals and that they are really useful.

I believe that even if you can identify those who are more and those who are less susceptible, it will not be very useful from a practical point of view. As already noted, it is very difficult for any individual to modify his diet when everyone else is eating differently. Whether one looks at what we know of obesity, hypercholesterolemia, or diabetes, dietary compliance at the individual level is poor. The exceptions are when the disease is severe and clearly identified—phenylketonuria, for example. Then it is obviously worthwhile to make very serious efforts to modify the diet of the individual. The likelihood that it is possible to identify individuals who will be certain to develop hypertension some 20–40 years later is, I think, remote. And even if possible, it is most unlikely that such individuals would find that a sufficient inducement to follow a “diet” for the rest of their lives.

If there is anything we have learned in attempts to control serum cholesterol by dietary means, it is that a real, although moderate, increase in risk of a heart attack many years in the future is not a very strong inducement to modify one’s diet. One needs to modify the family diet or, better still, the diet of the community. Mass diseases, like hypertension, need mass approaches.

**Treatment Versus Prevention**

It seems rather clear to me that many believe that the usefulness of preventive efforts can be judged by the effects of salt restriction in hypertensive patients. I think it is important to note that treatment and prevention are often not the same. The best example, I suppose, would be cancer. There is abundant reason to believe that a high fat diet is involved in the etiology of many cancers, yet few believe that cancer can be effectively treated with a low fat diet. Also, we now have substantial evidence that diets high in carotene or carotenoid pigments limit cancer incidence, especially cancer of the lung. It seems unlikely, however, that dosing with carotenoids will be effective treatment.

The evidence is clear that rats made hypertensive with high salt diets develop permanent hypertension; that is, they do not respond well to low salt diets. It is
reasonably clear that hypertensive patients also fit this pattern. The point I would make is that even those with mild hypertension must have some end-organ disease, and to a greater or lesser degree they are a changed organism. I think it cannot be presumed that we can evaluate the effectiveness of preventive efforts by studies of hypertensive patients, particularly those severely affected.

If so, then we cannot really develop trials to effectively evaluate the role of salt in the prevention of hypertension. In theory, at least, a true trial would require randomly distributed young subjects who would follow the diets for the 20–50 years it takes to develop hypertension. Such a study will not be done.

I think it important, also, to keep in mind that all public health trials will have errors that tend to invalidate the hypothesis. Such trials must be large and prolonged. There is no way that the dietary practice of individuals in such trials can be carefully monitored. If one tests the usefulness of a low salt diet, the slippage will be toward a higher salt intake than that desired and, thus, a tendency to yield a negative answer. It is not that we should not do trials, but the limitations of those kinds of trials should be recognized. I personally do not believe that we know enough about modifying foods to produce an acceptable low salt diet to warrant an effective field trial at this time.

The only long-term dietary data that we have are population data, such as that from INTERSALT. I believe that if any experimental study—be it a field trial, clinical study, or any other kind—yields results that are simply not reconcilable with the epidemiological data, we should believe the epidemiological data.

I speak, of course, only of data on populations with rather homogeneous dietary practices, not epidemiological studies within the United States or elsewhere. Although exceptions exist, our ability to quantify the individual consumption is so poor that such studies are rarely very useful. The NHANES data, for example, consist of what the subjects reported that they ate during a 24-hour period. Such data, even if it is accurate, have little or no relation to what the individual usually eats. In my opinion, such data should never be used to classify individuals into dietary groups. In populations like the United States, where the diet is relatively homogeneous and varies from one day to the next, it is extremely difficult to distinguish between diets of individuals by any method. Because the salt content of similar products depends entirely on how these products are prepared, the use of such data to estimate salt intake is especially poor.

**The Food Industries**

As has been discussed several times, the salt intake of Americans is largely dependent on what the food manufacturers put in the food. It seems reasonably clear that our dependency on manufacturing practice will increase in the future. I am told that the average American woman expects to spend no more than 30 minutes preparing dinner, which means that half of them expect to spend less than that. I do not cook, but I know there are a lot of things you cannot prepare from scratch in 15 or 20 minutes. We all know that more and more people eat at restaurants and fast food outlets. Whether this is desirable or not, there is little we can do about it. It would appear, however, that the opportunities to modify the salt content of many foods in the market are enormous. A recent issue of *U.S. News and World Report* compared the fat and salt contents of items in a picnic lunch purchased or prepared at home. I do not vouch for the accuracy of the information, but it appears in Table 1.

Such data must indicate the opportunities to modify the salt content of foods, depending on the recipe, and with a change in consumer demand, many such products will be modified. We have to find ways to alert the public about what they are getting. I might note, of course, some kinds of foods apparently need more salt than others to be satisfying. We don't know why this is, but it probably means that the opportunities are much greater with some products than with others. It is probably unrealistic to expect that all products can be made acceptable with a very low salt content.

I would call special attention to the studies reported by Beauchamp and Engelman indicating that if the salt is on the surface, it is much more effective. We may be able to "have our salt and avoid it too."

In conclusion, I believe that the question "Is salt restriction for everyone?" could be better phrased. For many, this conjures up the idea that everyone will be put on a low salt diet and that they will be forced to consume bland, insipid food for the rest of their lives. I can tell you that if that is what it means, it will not happen.

The real questions are as follows: What is a reasonable level of salt in the American diet to shoot for? What are the best strategies for getting there? What kind of advice should we give now to people who do not yet have hypertension? I doubt that anyone really believes that a chicken breast containing nearly a gram of salt is a better choice than a similar product with one tenth that amount. Long-term changes in the diet will be produced only if we

**Table 1. Fat and Salt Contents of Commercial and Homemade Picnic Lunches**

<table>
<thead>
<tr>
<th>Item</th>
<th>Commercial</th>
<th>Homemade</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Fat (g)</td>
<td>Salt (mg)</td>
</tr>
<tr>
<td>Fried chicken breast</td>
<td>23.7</td>
<td>787</td>
</tr>
<tr>
<td>Fried chicken leg</td>
<td>8.8</td>
<td>269</td>
</tr>
<tr>
<td>Biscuit</td>
<td>18.2</td>
<td>786</td>
</tr>
<tr>
<td>Potato salad</td>
<td>9.3</td>
<td>396</td>
</tr>
<tr>
<td>Coleslaw</td>
<td>6.9</td>
<td>261</td>
</tr>
<tr>
<td>Apple pie</td>
<td>12.0</td>
<td>412</td>
</tr>
<tr>
<td>Total</td>
<td>78.9</td>
<td>2,921</td>
</tr>
</tbody>
</table>
can develop foods with the desired characteristics that taste good. We need a lot of effort to determine why people like what they like and how we can produce modified foods that will still be acceptable. Much of the modification of foods will have to be done by the food industry. It seems certain that they will respond if there is sufficient demand. Many have already decided that “low salt sells.”

The problems involved in modifying any constituent in our diet are unique, but there are many parallels in the fat and cholesterol story with the salt story. A major difference is that the effort to lower salt intake was slow in starting. The public was well ahead of many of the experts in dealing with fat and cholesterol, and it appears to be true here also. I expect it to move in the same way.

**References**


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