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What Should We Tell Patients with Heart Failure about Sodium Restriction and How Should We Counsel Them?

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Abstract

This article is a review of current evidence regarding the recommended level of dietary sodium, involvement of family members in adoption of a low sodium diet, and evidence-based strategies to increase patient and family member willingness and ability to follow a low sodium diet. The available evidence suggests that recommending a 2.5 to 3 g sodium diet will meet nutritional needs and decrease risk of hospitalizations. The best strategy identified for patient success is to fully involve both patients and family members in jointly reducing sodium intake. Motivational interviewing techniques should be used before counseling begins to guide patients and family members toward realization of the need to follow a low sodium diet. Successful counseling starts with determining perceptions, barriers, and individual characteristics that impede adherence. This information is incorporated into theory-based teaching strategies to promote behavior change and successful adoption of a low sodium diet.

Keywords

Heart failure; Nutrition; Low sodium diet; Motivational interviewing; Counseling strategies; Self-management

Introduction

Dietary sodium restriction is commonly recommended for patients with heart failure to prevent fluid retention, exacerbation of symptoms, and hospitalization for acute decompensated heart failure. However, less than half of patients successfully follow the recommendation [1, 2]. This article is a review of current evidence regarding what to tell patients about sodium restriction and how to counsel them. It is focused on three areas in which there is newer evidence. The first is a review of current recommendations and recent evidence regarding what we should tell patients about dietary sodium restriction. The second highlights the importance of involving family members in adoption of a low sodium diet. The third is strategies to increase patient and family member willingness to follow a low sodium diet and the use of theory-based interventions to promote behavior change.

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Compliance with Ethics Guidelines

Conflict of Interest

Terry A. Lennie, Misook L. Chung, and Debra K. Moser declare that they have no conflict of interest.

Human and Animal Rights and Informed Consent

This article does not contain any studies with human or animal subjects performed by any of the authors.

What Should We Tell Patients About the Level of Dietary Sodium Restriction?

The most common world-wide recommendation from governments and health organizations is for individuals 15 years of age or older to limit sodium intake to less than 2.4 g per day [3–7] to prevent cardiovascular diseases. However, there is growing support for lower dietary sodium targets of 1.6 g per day for healthy adults [5], and 1.5 g per day for populations with higher risk for cardiovascular disease, including Blacks, middle-aged or older adults, and those with hypertension [3, 4]. Interestingly, dietary sodium recommendations for patients with compensated heart failure in the three major heart failure guidelines are comparatively less specifically restrictive (Table 1). The European Society of Cardiology guidelines include a statement that dietary sodium restriction may help control symptoms in patients with symptomatic heart failure (New York Heart Association Class III and IV) [8]. The American College of Cardiology Foundation/American Heart Association guideline includes the statement that some degree of sodium restriction (< 3 g) for patients with heart failure may be beneficial for improvement of symptoms [9]. The Heart Failure Society of America guidelines provide a more specific recommendation to limit dietary sodium to 2 to 3g per day [10]. The American Dietetic Association provides the most restrictive dietary sodium recommendation of < 2 g per day [11•].

Results from several studies have raised concern that restricting dietary sodium to < 2 g per day may not be beneficial and may even be harmful for patients with heart failure. These were controlled trials in which patients were randomized to either a 1.8 g or 2.8 g sodium diet. Patients were also placed on a 1 to 2 liter fluid restriction and high doses of diuretics. The earliest of these studies included a sample of 107 patients with severe heart failure followed for 7 to 36 months after discharge for treatment of heart failure exacerbation. Survival in the 2.8 g sodium diet group was significantly better than the 1.8 g sodium group (55 % vs. 13 %) [12]. Similar results were reported in a larger study of 232 patients with less severe heart failure (New York Heart Association Class II) enrolled 30 days post-discharge from hospitalization for decompensated heart failure [13•]. Over the 180-day study period, patients in the 1.8 g sodium intake group had a higher readmission rate. At 12 months, patients on the 1.8 g sodium diet higher rates of combined end point of hospital admissions or death compared to patients on a 2.8 g diet [14•].

An examination of physiologic changes in response to < 2 g sodium restriction may explain these outcomes. Sodium diets < 2 g were associated with changes indicative of a compensatory response to a sodium deficit. After 180 days, patients on the 1.8 g sodium diet had higher levels of B-type natriuretic peptide and aldosterone, and higher plasma rennin activity than patients on the 2.8 g sodium diet [13•, 15•]. Patients who were on the 1.8 g diet for 12 months had significantly higher levels of proinflammatory cytokines and lower levels of the anti-inflammatory cytokines than patients on a 2.8 g sodium diet [14•]. In a small study, 12 male patients with compensated heart failure placed on 7 days of a 1.6 g sodium diet had significantly higher norepinephrine, epinephrine, and angiotensin II levels and higher resting heart rates than when they were consuming a 5 g sodium diet [16•]. These data indicate that sodium restriction below 2 g in aggressively treated patients increased the counter-regulatory response triggered by heart failure, which could result in decreased effectiveness of beta blockers, angiotensin converting enzyme inhibitors, and angiotensin receptor blockers. They also indicate that adjustment of medications may be needed in patients who reduce sodium intake that were previously consuming a high sodium diet. While the results of these studies suggest that 2 g may be the lower limit for dietary sodium, they do not provide evidence for a safe upper limit for dietary sodium.

In a well-designed, prospective study of community dwelling patients with heart failure using multiple 3-day food diaries Arcand, et al. showed that patients with dietary sodium intake > 2.8 g had 1.4 times higher risk of all-cause hospitalization and 3.5 times higher risk

of mortality over a 3-year period [17••] than patients on lower sodium diets. In their study, patients were not stratified by heart failure severity, which may be an important consideration when recommending a specific level of sodium intake. In our prospective study using 24-hour urine to estimate sodium intake, we showed that restricting dietary sodium to < 3 g was more important for patients in New York Heart Association Class III and IV than less symptomatic patients in Class I and II [18•]. Patients in NYHA Class III and IV who consumed > 3 g had 2.5 times higher risk of hospitalization or death than Class III and IV patients who consumed less sodium. In contrast, patients in NYHA Class I and II whose sodium intake was higher than 3 g had better event-free survival than those with lower sodium intake. These data suggest that limiting sodium intake to < 3 g may be more important for patients in whom medications are no longer sufficient to control symptoms.

Another important caveat to consider when recommending a dietary sodium level is consideration of sources of sodium across cultures and countries [19]. In developing countries, there is growing trend toward people consuming more packaged, processed, and restaurant foods rather than raw foods they prepare themselves. Processed and restaurant foods tend to be much higher in sodium [20]. These include foods that are not typically perceived by consumers to be high in sodium. Consequently, there is a point at which further reductions in dietary sodium will require restricting foods. A recent study of dietary habits of American adults showed that a 2.8 g sodium diet was the lowest achievable reduction in dietary sodium that provided adequate intake of 27 key nutrients [21]. Given that the average sodium intake in the United States [20] and Europe [22] is similar, this observation may be equally applicable across Europe. In countries in which salt is used as a preservative [19], eliminating high sodium foods may eliminate essential sources of nutrition, resulting in deficiencies.

To summarize, the recent call to lower sodium intake in the general population to 1.6 g may not be applicable to patients with heart failure who are prescribed medications that can create a sodium avid state when dietary sodium is severely restricted. The preponderance of current evidence suggests that for patients with compensated heart failure, dietary sodium restriction in the range of 2.5 to 3 g is likely to provide adequate nutrition and be associated with lower risk of hospitalization. This level of sodium restriction may be most important for patients with advanced heart failure. It is important to emphasize there is only limited evidence to support this recommendation. Additional research is needed to verify the lower limit and determine the safe upper limit of dietary sodium according to both type and severity of heart failure.

What Should We Tell Patients About Other Nutrients?

Sodium is only one component of the diet important to the health of patients with heart failure [23, 24]. Therefore, a whole diet approach should be used when teaching patients about limiting dietary sodium, as this will assure adequate nutrient intake is achieved while meeting the goal of reducing dietary sodium. Common dietary deficiencies identified in patients with heart failure include calcium, folate, magnesium, vitamin D, vitamin E, and zinc [25–27]. Deficiencies in thiamin have been less consistently reported; however, because thiamin is water soluble, patients with heart failure on loop diuretics may need more thiamin than recommended for healthy adults [28]. Table 2 lists foods high in these nutrients that can be emphasized.

Finally, omega-3 fatty acid supplementation has been shown to have some benefit in patients with heart failure. The GISSI-HF trial provided evidence for the safety, efficacy, and tolerability of omega-3 fatty acid supplementation [29••]. Nearly 3,500 patients with heart failure were randomized to receive 1 g of omega-3 fatty acids/day for a median of 3

years. Omega-3 supplementation was well tolerated and did not produce adverse effects. The treatment resulted in a modest decrease in all cause hospitalization and death.

How Should We Counsel Patients?

Involve Family Members—The importance of family member involvement in following a low sodium diet has received increased recognition [30–32]. Most dietary behaviors occur in the home within a family setting and members have very similar diets with respect to foods consumed and sodium intake [33, 34]. Grocery shopping, preparing meals, and eating together are key components of social interaction among family members. Lack of family support for following a low sodium diet can result in patients feeling isolated and may even lead to family conflict [35]. A randomized, controlled pilot study demonstrated the effectiveness of involving the family in promoting adherence to a low sodium diet [36]. In one group, patients and family members received education on how to follow a 2 g sodium diet combined with patient and family member counseling on how to support the patient in reducing sodium intake. The sessions included helping family member in development of communication techniques to provide of supportive, empathetic messages, increase patient to confidence in ability to follow diet, and give nonevaluative feedback. Strategies also included increasing patient and family member's problem solving skills in situations where sodium indiscretion occurs, such as at restaurants and or large family events. In the other group, patients and family members only received diet education. Patients whose family members received support counseling reduced their sodium intake by 24 %, while patients whose family members only received education did not decrease their sodium intake. Thus, the classic approach focusing on improving knowledge of family members about low sodium diet was not effective for improving patients' dietary adherence behavior. Family members, however, were only involved in helping the patient follow a low sodium diet; they did not follow the same diet. Consequently, this approach does not address the essential problem of patients feeling isolated when their family members eat a different diet [35]. Based on these observations, we developed a patient–family approach that addresses this problem.

Patient–family approach requires a direct, proactive role of family members to follow the same low sodium diet. This is a dual team approach in which each member supports the other in following a low sodium diet, from planning grocery shopping to dining. They jointly set both short-term and long-term goals that are realistic and achievable. Family members jointly review their eating patterns to identify high sodium foods. They discuss their preferences for alternative foods to replace high sodium foods and identify shopping strategies, including reading food labels, before grocery shopping. Cooking methods jointly identified to decrease sodium content in foods is also a fundamental strategy in the patient–family approach.

There are two major benefits to this approach. First, patients with heart failure have been reported to be three to four times more likely to be adherent to low sodium diet when their family members (spouses or non-spouses) followed the same diet compared to patients whose family members do not follow the same diet [37]. Second, current dietary sodium recommendations for healthy adults indicate that family members would also greatly benefit from reducing sodium intake [4]. This is particularly true for family caregivers, such as those of patients with heart failure, who have been reported to be at 35–95 % higher risk for developing cardiovascular disease than non-caregivers [38, 39].

In summary, family members are a major influence on the dietary patterns of patients with heart failure. The ideal approach to promoting adoption of a low sodium diet is to fully involve all family members in adopting the same diet. In addition to being effective, this approach is logical, as the evidence shows family members will also benefit from adopting a

low sodium diet. Patients who do not have family members may be at higher risk for nonadherence as they do not have the support of others to assist with behavior change. The following counseling strategies, however, can be equally effective when applied to patients who live alone, or to patients and family members.

Counseling Strategies—Counseling strategies to promote adherence to a low sodium diet should: 1) include the knowledge and skills that patients and family members require to engage in this activity, 2) address specific attitudes and perceptions that might interfere with adoption of the diet, 3) consider individual patient and family member characteristics that impede adoption of a low sodium diet, and 4) use approaches that focus on promoting behavior change.

Appropriate Knowledge and Skills: Many health care providers have simply told patients to “follow a low salt” diet without telling them what this means [40] or how to do it [35]. To effectively follow a low sodium diet, patients and family members need to know their target level of daily sodium intake and the context for determining this target. That means they first need to be given the knowledge and skills to identify the sodium content of foods they eat and to calculate their daily intake. They use this information to understand their baseline eating patterns and the determine impact of changes they make over time. Obtaining knowledge and skills related reading a food label and calculating the sodium content in the portions they eat, retrieving the information needed to accurately estimate the sodium content of meals and snacks eaten outside of the home, choosing low sodium alternatives, and identifying high and low sodium foods are major learning outcomes [41•]. Patients and family members also have many misperceptions about sodium that should be clarified. For example, patients have reported the belief that the effect of consumption of high sodium foods can be counteracted by the addition of certain other foods (e.g., fruits), or that high intake of water will remove sodium [35, 40, 42].

The strategy of telling patients and family members to stop using the salt shaker in cooking and at the table is misleading and ineffective, because the vast majority of sodium consumed in the diet is in restaurant and processed/prepackaged foods. Thus, a better approach is teaching patients and family members how to shop for and cook with fresh or frozen foods, and to avoid boxed, canned, and manufacturer processed foods.

When teaching patients and family members the skills needed to follow a low sodium diet, it is essential to integrate cause and effect information [43]. One reason patients report adhering to the diet is fear of symptoms and rehospitalization. Healthcare providers can capitalize on this by linking sodium intake with escalating symptoms so that patients understand the connection, and then providing clear, direct advice about how to follow the diet. For example, healthcare providers can help patients link their symptoms to sodium intake and then to actions (sodium reduction) that decrease or avoid symptoms. Patients do not naturally make this link, and that is a common reason for nonadherence to a low sodium diet [35]. For family members, it is important to help them link a low sodium diet with cardiovascular risk reduction benefits.

Attitudes and Perceptions that Interfere with Adoption of a Low Sodium Diet:

Common reasons for not following a low sodium diet include bad taste of food without added salt, cost of fresh fruit and vegetables, limited food choices, not receiving adequate (or any) instructions about how to follow the diet, difficulty following the diet when eating away from home, and social conflict when others, family or friends, do not follow the same diet [35, 44]. Diet confusion when patients with comorbidities are asked to follow more than one diet creates an additional barrier [35].

Individual Characteristics that Impede Adoption of the Sodium Restricted Diet:

A number of factors can dramatically impede adoption of a low sodium diet [45]. Most prominent among these are depression, cognitive impairment, poor health literacy, presence of multiple comorbidities, social isolation, poor financial status, and poor functional status [41, 45]. Healthcare providers need to be aware of need to assess for these potential factors as patients and family members are not likely to divulge these without formal assessment. We have successfully used the following brief, valid and sensitive instruments for assessment and research purposes. Depression can be assessed using the Patient Health Questionnaire [46], which is available online and free of charge. Health literacy can be assessed using the Newest Vital Sign, also available online, free of charge [47]. Cognitive impairment can be assessed using the Montreal Cognitive Assessment scale. These two instruments and respective scoring instructions can be found online by using any major search engine. Social isolation and financial status can be assessed by a careful, sensitive conversation with the patient.

Depression should be managed by the clinician (with routine reassessment of status) or by referral. Low health literacy requires an approach and use of materials that recognize the need for increased simplicity in explanations, specificity in teaching, and constant assessment of what message the patient heard. Cognitive impairment, if more than mild, will require involving family members or other responsible people to help the patient self-manage heart failure. In the case of socially isolated patients, home health services should be employed. Social services can also be accessed for patients who are socially isolated or financially deprived. Patients with type D personality, which is a combination of social inhibition and negative affect, may require additional efforts to encourage them to seek appropriate counseling [44].

Fewer than 10 % of patients with heart failure are expert at self-care [48]. Although more time in the short-term is required to assess for these characteristics to ensure that a low sodium diet is successfully adopted, time will be saved in the long-term because less time will be spent addressing consequences related to nonadherence.

Effective Approaches to Promoting Behavior Change

Motivational Interviewing

The way an intervention is delivered is a major part of the success of any strategy, intervention, or approach to promoting behavior change [49••]. Paternalistic or confrontational styles, common in healthcare, have been demonstrated to often have the opposite effect of what is intended, and thus, are not advocated to facilitate behavior change [50]. Healthcare providers are excellent at giving advice about which behaviors need to be changed, but not as good at motivating behavior change. Motivational interviewing recognizes the negative approaches that healthcare providers commonly use and offers a highly effective, well-validated alternative approach [51] that should underpin all attempts at behavior change.

Motivational interviewing is instituted *prior* to making a recommendation for a behavior change. The health care provider engages the patient in a guided conversation using a carefully selected series of questions within a conversation that helps patients and family members realize and then state the need for the desired behavior change. It is only at this point that the healthcare provider makes a recommendation for the behavior change.

Motivational interviewing approaches can be both brief and effective, making this approach feasible for a busy clinic. Key skills that must be used for maximum effectiveness include: 1) listening to the patient and family member; 2) expressing empathy (in several studies

[50], this was the skill shown to be the primary factor related to behavior change); 3) assisting the patient and family member to develop dissonance or discrepancy (i.e., getting them to express that their life goals and their current actions are not in concordance); 4) avoiding arguments with the patient and family member; 5) helping the patient and family member work through and problem solve resistance; and 6) supporting self-efficacy, as it is essential to effective behavior change.

A typical brief motivational counseling session can be guided by the principles of feedback, responsibility, advice, menu of options, empathy, and self-efficacy (FRAMES) [51]. Feedback is an excellent way to start a session and means that the clinician provides patients and family members with feedback that reflects their behavior. For example, laboratory values, blood pressure readings, body mass index, heart failure signs and symptoms are all types of feedback that can be used to begin a motivational interviewing session. Responsibility means that the clinician recognizes patients and family members are autonomous beings that have the responsibility for changing behavior. Despite the injunction against telling patient and family members what to do, providing specific advice when it is solicited is an important part of motivational interviewing. Menu of options means that patients and family members are given alternatives about what they would like to discuss at a session, are given options about meeting their goals, and are given options about approaches to gaining education and about follow-up. Empathy (i.e., reflective listening during which the clinician expresses and clarifies the patient's meaning) is the basic approach that must be taken by any clinician wishing to promote behavior change. Finally, self-efficacy (or confidence that they can undertake the behavior change in question) should be promoted during these sessions.

Motivation interviewing can be highly effective in leading patients and family members to the realization of need to change behaviors and development of motivation to make behavior changes, such as adopting a low sodium diet. It requires healthcare providers to modify the typical patient teaching approach and develop new counseling skills that include resisting the urge to inform patients and family members of the need to change behavior, and instead systematically leading the patient and family member to identify, for themselves, which behaviors need to change and to seek advice on how to change them. Available web-based resources for motivational interviewing techniques include:

www.motivationalinterviewing.org and www.motivationalinterviewing.com.

The Theory of Planned Behavior

When the patient and family member have identified the need to adopt a low sodium diet, theory based teaching strategies can be used to help them successfully change behaviors. We and others have found, through randomized controlled trials of self-care strategies, that the Theory of Planned Behavior is an excellent model upon which to base self-care interventions, like those designed to increase adherence to the sodium restricted diet [32, 52–54]. The Theory of Planned Behavior posits that an individual's *attitudes*, *subjective norm*, and *perceived behavioral control* predict whether or not that person will engage in healthy behavior change [54–58]. This theoretical approach allows for consideration of cultural differences regarding sodium and food that exist among patients and families living in different regions or countries. Attitudes about behaviors are formed as a result of an individual's beliefs about the value of the outcomes associated with engaging in the behavior. A person develops a positive attitude toward engaging in a behavior when they understand and value the outcomes of that behavior. Thus, helping to develop a positive attitude is encouraged when the link between fluid overload, symptoms, and a high sodium diet is explained in terms understandable to the patient and family members. The benefits of following a low sodium diet and the consequences of fluid overload can be discussed to improve attitudes toward the behavior.

Subjective norm is defined as the perception of the individual about the importance that significant others (e.g., spouses, children, physicians) attach to the behavior and its adoption by the individual. Under the tenets of the Theory of Planned Behavior, those who perceive that their significant others believe they should follow a low sodium diet, and who are then interested in meeting their expectations will change behavior to adhere to the recommendation. Therefore, adoption of the low sodium diet can be promoted when healthcare providers consistently convey their expectation that the patient and family member follow the diet and engage patient and family co-support of this change in behavior.

Perceived behavioral control refers to the beliefs about the ability to overcome the barriers to adopting a low sodium diet. The first step in enhancing perceived behavioral control is to determine individual barriers to following a low sodium diet while taking into account the available resources to support adoption of the diet. Perceived behavioral control is enhanced by promoting acquisition of the skills needed to follow the diet, including identifying and substituting high sodium foods with low sodium foods they enjoy, understanding food labels, choosing low sodium foods from restaurant menus, and using sodium-free seasonings on foods to enhance flavor. If patients follow a low sodium diet for a few weeks by gradually decreasing sodium intake (instead of abruptly decreasing), their taste buds adapt to the flavor of a low sodium diet, making it easier to maintain the diet long term. This strategy should be incorporated into patient teaching by healthcare providers in order to increase perceived control.

Summary and Conclusion

To date, no clinical trials have been conducted to determine the optimal level of sodium restriction. The best available evidence suggests that a 2.5 to 3 g sodium diet is effective in promoting adequate nutritional intake and decreasing risk of hospitalizations, particularly for patients with advanced heart failure. However, additional research is needed to identify the safe upper limit of sodium intake in patients with heart failure, and to determine whether this limit differs by severity and type of heart failure. For patients living with family members or friends, the ideal strategy is to fully involve both patients and household members in jointly reducing sodium intake. There is good evidence that making this behavior change is beneficial to both. For patients without family members or friends, providing appropriate social support and being a source of social norms is essential to success. Several steps should be followed in counseling patients and family members about adopting a low sodium diet. First, it is essential to assess for perceptions, barriers, and individual characteristics that impede ability of patients and family members to make behavior changes and to incorporate these into the teaching plan. Second, motivational interviewing techniques should be used to help patients and family members identify the need for behavior change and ask for advice regarding ways to change behavior prior to health care providers recommending a low sodium diet and any changes in behavior. Last, a teaching plan should be developed based on the Theory of Planned Behavior to promote behavior change and successful gradual adoption of a low sodium diet to promote long-term adherence.

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Table 1

Dietary sodium intake guidelines for patients with heart failure

Organization	Recommendation	Level of evidence
American Dietetic Association [11•]	Sodium intake should be less than 2 g/day. Sodium restriction will improve symptoms (i.e. edema, fatigue) and quality of life.	Fair. Committee believed benefits outweigh harm, but quality of evidence is limited
American College of Cardiology Foundation/ American Heart Association [9]	Sodium restriction is reasonable for patients with symptomatic heart failure to reduce congestive symptoms.	Level C. Very limited populations studied. Only consensus opinion of experts, case studies, or standard of care
European Heart Failure Society [8]	Sodium restriction may help control the symptoms and signs of congestion in patients with symptomatic heart failure classes III and IV.	No level. Committee considered evidence insufficient to be leveled
Heart Failure Society of America [10]	Dietary sodium restriction (2–3 g daily) is recommended for patients with the clinical syndrome of heart failure and preserved or depressed left ventricular ejection fraction.	Level C. Expert Opinion. Observational studies-epidemiologic findings; safety reporting from large- scale use in practice

Table 2

Sources of nutrients frequently deficient in diets of patients with heart failure

Nutrient	Sources
Calcium	Yogurt
	Low fat, low sodium milk and cheese
	Fortified orange juice
	Fortified ready to eat cereals
	Calcium-set tofu
Folate	Chinese cabbage, kale, and broccoli
	Enriched cereal grains and fortified ready-to-eat cereals
	Dark leafy vegetables especially spinach
	Asparagus, Brussels sprouts, romaine lettuce
Magnesium	Whole-grain breads and bread products
	Wheat bran
	Almonds and cashews
	Green vegetables such as spinach
	Mixed nuts
Thiamin	Bran flakes and shredded wheat
	Fortified oatmeal
	Foods enriched or fortified with thiamin including ready-to eat cereals
	Whole-grain products: bread and bread products
Vitamin D	Mixed foods with grain as main ingredient
	Swordfish, salmon, and tuna
	Fortified milk and milk products including yogurt
	Fortified orange juice
Vitamin E	Fortified ready to eat cereals and eggs
	Wheat germ oil
	Sunflower seeds
	Vegetable oils: sunflower and safflower
	Hazel nuts
Zinc	Almonds and peanuts
	Raw cereal grains
	Crab and oysters
	Beef and lamb
	Fortified cereals

Office of Dietary Supplements; National Institutes of Health <http://ods.od.nih.gov/factsheets/list-all/>