

The Role of Calcium In Prevention of Chronic Diseases

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Calcium, which has diverse biological roles, is essential for such processes as structural support, cell adhesiveness, mitosis, blood coagulation, muscle contraction and glandular secretion. The role of calcium in chronic diseases must, based on emerging research findings, involve the participation of both the calcium-regulating hormones (parathyroid hormone and 1,25(OH)₂cholecalciferol) and the calcium receptor located in the enveloping membranes of most cell types of the body. The contributions of these hormones to the regulation of blood calcium in relation to osteoporosis and osteomalacia have been well established. However, our understanding of the roles of the calcium receptor in cellular functions is just beginning to crystallize. Chronic diseases related to low calcium intake may result from a common mechanism involving the calcium-regulating hormones and the calcium receptors, or they may be due to several different, but closely linked, mechanisms that are triggered by inadequacies of dietary calcium. The answers to this conundrum must await further investigation.

Through these various biological roles and other mechanisms calcium is involved in reducing the risk of osteoporosis, hypertension, colon cancer, breast cancer, kidney stones and lead intoxication [1–6]. Current recommendations for calcium intake have considered the importance of reducing the risk of these chronic diseases [7,8]. Consuming a diet adequate in calcium intake involves a relatively easy lifestyle change. Unfortunately, results of recent surveys indicate that few Americans are meeting recommendations for calcium intake. Data from the USDA Continuing Survey of Food Intakes by Individuals, 1994–1996, clearly demonstrate that calcium intake is low throughout the US population [9]. Low consumption of milk and other dairy foods is the primary reason that large percentages of the US population are failing to meet their calcium needs [10]. The use of calcium supplements and calcium-fortified foods may help to alleviate inadequate intakes of calcium from dairy foods, but these additional sources fail to deal with the real problem in the US, which is poor dietary patterns of food selection [10,11]. Diets low in calcium are low in many other essential nutrients [12]. The reason for this is that

calcium-rich dairy foods also supply 31% of the riboflavin, 20% of the protein, 19% of the zinc, 18.5% of the potassium, 17% of the vitamin A, 16% of the magnesium and 10% of the

Table 1. Percentage of Individuals Meeting 100 Percent of 1989 RDA and 1997 AIs for Calcium by Gender and Age, Two-Day Average, 1994–1996

Gender and Age (Years)	N	Calcium (% of 1989 RDA)	Calcium (% 1997 AI) 1997
Males & Females			
Under 1	269	72.4	97.0
1–2	1316	48.7	80.8
3–5	1432	43.5	56.4
5 and under	3017	48.9	69.9
Males			
6–11	726	55.5	37.7
12–19	696	36.3	32.2
20–29	723	39.3	35.8
30–39	820	51.9	35.3
40–49	815	48.8	32.0
50–59	848	39.2	14.6
60–69	809	43.2	13.0
70 and over	736	38.8	12.6
20 and over	4751	44.6	27.4
Females			
6–11	706	42.5	29.2
12–19	702	13.5	11.7
20–29	675	16.9	15.7
30–39	774	25.3	14.4
40–49	870	23.9	11.5
50–59	824	23.3	5.0
60–69	755	20.7	3.6
70 and over	674	20.8	3.6
20 and over	4572	22.0	10.2
All individuals	15170	34.9	24.8

Excludes breast-fed children.

1989 RDA's used are 0–5 months: 400 mg, 6–11 months: 600 mg, 1–10: 800 mg, 11–25+: 800 mg, pregnant or lactating: 1200 mg.

1997 Average Intakes used are: 0–5 months: 210 mg, 6–11 month 1–3: 500 mg, 4–8: 800 mg, 9–18: 1300 mg, 19–50: 1000 mg, 51+: 1200 mg, pregnant or lactating: no difference from age group requirement.

SOURCE: USDA Continuing Survey of Food Intakes by Individuals, 1994–96 (9).

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vitamin B6 to the food supply while providing only 12% of the fat and 9% of the energy [12]. The results of several research studies have demonstrated that it is possible to meet current recommendations for calcium intake through foods without increasing fat or calorie intake, without excessive weight gain and without negatively impacting on blood lipids, while improving the nutritional quality of the diet [13–15]. For this reason, health professionals recommend that we meet our calcium needs through foods first [16]. Continuing education of consumers will be needed to overcome the current deficit of calcium in the US diet and reduce the risk of related chronic diseases [17].

The papers presented in this supplement discuss current recommendations for calcium intake and the criteria used to derive those numbers [1]. They also provide background on the potentially important risk factors, primarily dietary and biochemical, which contribute in significant ways to four major health problems: kidney stones, colon cancer, breast cancer and hypertension [2–5]. These state-of-the-art contributions indicate that dietary factors are intimately entwined in the pathogenesis of these chronic health issues.

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