

Avocado fruit is a rich source of beta-sitosterol

To the Editors:

As dietitians strive to learn more about dietary supplements and fabricated foods, it is important to stay abreast of new knowledge about whole foods. Recently, analysis of avocados has provided new information showing that this fruit is a significant source of dietary phytosterols. Avocados rank as the 14th most commonly consumed raw fruit in the United States (1).

Phytosterols are the plant analogues of cholesterol. There are three predominant phytosterols: beta-sitosterol, campesterol, and stigmasterol (2), all of which function as anticholesterolemic agents (3). The mechanism for the serum cholesterol-lowering effect of phytosterols involves inhibition of intestinal cholesterol absorption and decreased hepatic cholesterol synthesis (3,4).

Hass avocados are the pebbly dark-skinned variety that is grown in California and accounts for over 75% of the nation's domestic crop (5). For analysis, 36 just-ripe Hass avocados (those that yielded slightly to gentle pressure) were purchased from three San Diego supermarkets (12 avocados from each supermarket) on January 25, 1999, and again on May 5, 1999, to control for seasonal variation. The avocados were sent via overnight delivery to Covance Laboratories in Madison, Wisconsin, where each set of 12 avocados was hand-peeled, the stones were removed, and the fruit was combined to form one sample and then analyzed for sterol content.

Among the phytosterols examined, the data clearly show that beta-sitosterol is most abundant, being present at 76.4 mg per 100 grams of raw edible avocado fruit (Table 1). The next most abundant phytosterol is campesterol, which was present at 5.1 mg per 100 grams. Stigmasterol was below the lower limit of

Table 1

Sterol composition of six samples of California Hass avocados.

Sample (date)	beta-sitosterol mg/100g	campesterol mg/100g	stigmasterol mg/100g
1 (01/25/99)	64.4	4.5	<3.0
2 (01/25/99)	61.5	5.3	<3.0
3 (01/25/99)	72.6	5.0	<3.0
4 (05/05/99)	98.4	5.8	<3.0
5 (05/05/99)	76.7	4.7	<3.0
6 (05/05/99)	84.8	5.4	<3.0
Mean	76.4	5.1	<3.0
Standard Deviation	12.5	0.4	0

detection (<3 mg/100g).

The beta-sitosterol content of the 20 most frequently consumed fruits in the

Table 2

Beta-sitosterol composition of the 20 most frequently consumed fruits in the United States.

Fruit ^a	beta-sitosterol mg/100g ^b
Banana	11
Apple	11
Watermelon	1
Orange	17
Cantaloupe	8
Grapes	3
Grapefruit	13
Strawberries	10
Peach	6
Pear	7
Nectarine	NA
Honeydew	NA
Plum	6
Avocado	76
Lemon	8
Pineapple	4
Tangerine	NA
Sweet cherries	12
Kiwi fruit	NA
Lime	NA

NA = Data Not Available

^a Raw Edible Portion Weight

^b Beta-sitosterol values for all fruits except avocado were previously reported (3).

United States is shown in Table 2 (1). Avocados clearly provide more beta-sitosterol than any of the other fruits with known values. On an ounce-per-ounce basis, avocados contain more than four times the beta-sitosterol of oranges, which had previously been reported as the richest known fruit source of beta-sitosterol (2).

Avocados meet the definition of a functional food as outlined by the ADA Position Statement in that they provide health benefits beyond basic nutrition (6). A typical California avocado weighing 173 grams would contain 132 mg beta-sitosterol. This level is significant as a phytochemical, and is in the same range as that found in phytosterol dietary supplements.

Dietitians can use the findings of this study to encourage the public to eat avocados as part of a phytochemical-rich diet.

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An international dietetics internship experience

To the Editors:

Four dietetics interns and one faculty member from Kansas University Medical Center spent one month in Kenya on an international nutrition rotation. The experience was the result of one student's interest in international nutrition. A medical mission set the itinerary and the clinic locations. Four team meetings were required prior to departure to address health, safety, and cultural issues, to prepare the team for the experience.

Most of the time was spent working in the Mathare Valley slum of Nairobi. The slum is home to over 500,000 people, where the police report a rape and a mugging every 3 minutes (1). Here, children and stray animals compete for any morsel of food on the ground. There is no running water or latrines in most of the homes.

Thousands of Kenyans are sick or dying, with many of them carrying the HIV virus. Statistics reported from the National Council of Population and Development revealed that 30 percent of the population has AIDS (2). The daily struggles of survival encompass the lives of the Kenyans, who spend hours each day searching for food and maintaining a

shelter. This leaves little time for concern about death from AIDS. Starvation is escalating as Kenya enters the second year of drought, affecting more than 22 million of its 30 million citizens.

Clinics were held in churches and provided care for over 2,000 individuals during the month. The primary diagnoses found in clients treated were upper respiratory infections, parasites, malnutrition, and sexually transmitted diseases. Various forms of malnutrition were observed, primarily in infants and children (calorie, protein, vitamin A, vitamin D, and iron deficiency). The interns taught classes in hand-washing, treatment of diarrhea, nutrition during breastfeeding, and economical dietary sources of protein, vitamin A, and iron. The team provided multivitamin supplements and medications at no charge to individuals who needed them.

The interns accomplished 14 Competency Statements for Dietitians (3) during the rotation. The interns worked closely with nurse practitioners and nurses and gained extensive experience in completing physical assessments of individuals seen in the clinics.

Upon completion of the experience, the medical mission team completed a written critique of the trip. The entire team thought that the outreach to Kenya was a great experience and strongly agreed that their education and career has been enhanced by the experience. The team met as a group after the trip for debriefing. Concerns included not being able to adequately treat the large numbers of individuals who requested care, inadequate equipment, and limited ability to follow up on the care provided. The four dietetic interns met with the faculty to review and evaluate the experience. The interns rated the rotation using the required forms and strongly agreed that the experience was well planned and conducted.

The Department, the School of Allied Health, and the university considered

this experience to be a great success. The faculty and interns are planning to participate in future medical mission trips.

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