brand was analyzed. All products except flours required air-drying and fine grinding before analysis. Samples were stored frozen until needed for analysis. A few products that were high in fat were defatted prior to analysis.

Moisture content of the samples was determined by vacuum-oven drying at 70° C overnight. SF and insoluble fiber (IF) values were determined following the enzymatic-gravimetric method of Prosky et al (1988). TDF was taken as the sum of SF and IF.

RESULTS AND DISCUSSION

Processed bakery foods and other cereal-based products usually contain more fiber than can be collectively attributed to flour and other fiber-containing ingredients used in the formula. This occurs primarily because of the formation of resistant starch and Maillard reaction products during processing.

White flour itself contains about 2.5% TDF. A good portion of this fiber, as results in Table I and earlier findings (Ranhotra and Gelroth 1988) suggest, is SF. In contrast, whole wheat flour and its bran and germ fractions, although containing as much or more SF than white flour, are predominantly a richer source of IF than SF. For example, bran contained 2.1% SF, but this represented only 5% of the TDF in bran (Table I).

Bread and related products are an important component in the diet of many Americans. These products are low in fat and sugar and are a good source of available carbohydrates. Several of these products are also a good source of SF when considered as a component of TDF. TDF in these products ranged between 1.77% (biscuits) and 13.57% (wheat "lite" bread) Table II. Although lowest in TDF, biscuits still contained 62% of the TDF as SF; "lite" breads, in contrast, contained less than 10%. The three white breads averaged 2.72% TDF, of which about one-third was SF; in an earlier study, SF in white bread averaged 41% of TDF (Ranhotra and Gelroth 1988). As a percentage of TDF, SF in oatmeal breads averaged no higher than SF in white bread. In general, products made with all-white flour appeared to be a good source of SF.

Some crackers and snack items also appeared to be relatively good sources of SF (compared with TDF). This is particularly true for saltines and honey grahams (Table III). Among the sweet goods analyzed (Table IV), oatmeal cookies, vanilla wafers, ginger snaps, and shortbread cookies are also relatively good source of SF. These products, however, also contain fat and sugar. For this reason, especially if the fat used in these products is saturated fat, excessive consumption of these products may negate the anticipated cholesterol-lowering effect of SF.

TABLE I
Total and Soluble Fiber in Wheat and Its Fractions

Product	Percent Fiber		Percent Water
	TDF[a]	SF[a]	
Straight flour	2.51	1.09	15.0
Patent flour	2.50	1.31	14.7
Whole wheat flour	10.24	1.32	15.9
Germ	9.31	1.14	14.3
Bran	44.03	2.10	15.6

[a]Total dietary fiber (TDF) and soluble fiber (SF).

TABLE II
Total and Soluble Fiber in Bread and Related Products[a]

Product	Percent Fiber		Percent Water
	TDF	SF	
White bread A	2.99	1.02	36.7
White bread B	2.60	0.96	36.0
White bread C	2.57	0.81	38.5
Whole wheat bread A	7.40	1.05	39.6
Whole wheat bread B	8.12	1.14	39.7
Cracked wheat bread	6.75	0.95	35.2
Oatmeal bread A	3.73	1.23	36.3
Oatmeal bread B	4.31	1.01	37.8
Pumpernickel bread	7.14	1.79	40.0
White pita bread	2.70	1.16	26.5
Rye (German) bread	8.29	1.49	36.8
French bread	3.09	1.03	38.0
Mixed grain bread A	5.56	0.98	38.6
Mixed grain bread B	5.63	0.62	40.3
Mixed grain bread C	9.62	1.25	39.5
Bran bread	5.41	0.81	39.1
Multigrain bread A[b]	3.38	1.39	38.3
Multigrain bread B[b]	4.94	1.19	38.8
Sour dough bread	3.01	1.01	36.4
Raisin bread	4.27	0.96	30.1
White "lite" bread	12.76	0.49	44.3
Wheat "lite" bread A	13.57	0.48	42.7
Wheat "lite" bread B	10.90	0.91	41.5
Mixed grain "lite" bread	13.56	0.91	39.3
Cellulose bread	9.94	1.09	41.5
Hamburger buns (white)	2.59	0.89	35.0
French rolls	3.23	1.01	30.8
Brown and serve rolls	3.03	1.12	23.5
Corn bread	2.48	0.48	29.0
Bagels (plain)	2.47	0.94	34.5
Biscuits (refrigerated)	1.77	1.10	29.7
Bread sticks	3.04	1.24	4.6
Corn tortillas A	4.33	0.95	43.8
Corn tortillas B	5.05	0.69	49.0
Flour tortillas	2.30	1.02	29.3
Croissants	2.32	0.86	20.4

[a]Total dietary fiber (TDF) and soluble fiber (SF) values are expressed on products as-purchased or as-consumed basis.
[b]Also contained vegetable powder.

TABLE III
Total Dietary Fiber (TDF) and Soluble Fiber (SF) in Selected Crackers and Snack Items[a]

Product	Percent Fiber		Percent Water
	TDF	SF	
Saltines	2.34	1.21	3.0
Honey grahams	2.98	1.27	3.0
Whole wheat crackers	10.86	1.77	1.9
Snack crackers[b]	2.04	0.97	3.3
Cheese crackers	2.45	1.08	3.5
Wheat crackers	4.02	1.13	1.7
Melba toast (white)	6.15	1.53	5.1
Melba toast (wheat)	8.87	1.79	5.9
Corn chips	4.29	0.43	1.1
Pretzels (hard)	3.66	0.94	3.5
Pretzels (soft)	2.49	0.93	32.7
Taco shells	6.33	0.91	4.2

[a]Values are expressed on products as-purchased basis.
[b]With sprayed-on fat.

TABLE IV
Total Dietary Fiber (TDF) and Soluble Fiber (SF) in Selected Sweet Goods[a]

Product	Percent Fiber		Percent Water
	TDF	SF	
Oatmeal cookies	2.57	1.10	4.9
Chocolate chip cookies	2.60	0.70	4.1
Vanilla wafers	1.50	0.81	5.5
Ginger snaps	1.54	1.02	2.9
Cream-filled chocolate cookies	3.48	0.97	1.6
Shortbread cookies	1.79	0.86	3.8
Brownies	2.54	0.55	12.8
Angel food cake	0.77	0.28	35.5
Devil's food cake	2.48	0.74	30.4
Ice cream cones	3.02	1.32	6.0
Apple pie	1.57	0.67	44.9
Cream-filled cupcakes[b]	0.84	0.31	22.1
Cinnamon rolls	2.41	0.75	19.2
Cake doughnuts	1.70	0.57	24.5
Yeast raised doughnuts	1.21	0.52	21.1

[a]Values are expressed on products as-purchased basis.
[b]Nondairy cream filling.

TABLE V
Total Dietary Fiber (TDF) and Soluble Fiber (SF) in Selected Breakfast Items[a]

Product	Percent Fiber		Percent Water
	TDF	SF	
English muffins	2.78	0.84	43.1
Blueberry muffins	1.66	0.53	33.6
Bran muffins	3.25	0.75	23.3
Oatbran muffins	1.69	0.54	26.3
Waffles (frozen)	1.89	0.69	37.7
Puffed wheat	7.53	2.38	6.9
Toasted oats	7.02	2.76	3.5
Raisin bran	13.50	2.37	7.6
All bran + fiber	51.20	2.58	3.1
Shredded wheat	12.53	1.55	7.1
Cream of wheat	3.82	1.57	9.5

[a]Values are expressed on products as-purchased or as-consumed (waffles) basis.

TABLE VI
Total Dietary Fiber (TDF) and Soluble Fiber (SF) in Dry and Cooked Pasta and Rice

Product	Percent Fiber		Percent Water
	TDF	SF	
Spaghetti (dry)	3.64	1.48	9.2
Spaghetti (cooked)	1.30	0.40	73.4
Egg noodles (dry)	3.91	1.39	9.3
Egg noodles (cooked)	1.83	0.53	67.3
White rice (dry)	1.25	0.27	8.7
White rice (cooked)	0.71	0.03	77.5

TABLE VII
Soluble Fiber from Bakery Products

Product	Serving Size	Fiber (g)	
		TDF[a]	SF[a]
White bread	2 slices (56.8 g)	1.55	0.53
Hamburger bun	1 bun (56.8 g)	1.47	0.51
Saltines	10 crackers (28.4 g)	0.66	0.34
Biscuit	1 biscuit (56.8 g)	1.01	0.62
French bread	3.5 slices (100 g)	3.09	1.03
Total		7.78	3.03

[a]Based on values listed in Tables II and III for total dietary fiber (TDF) and soluble fiber (SF).

Some of the breakfast items, e.g., English muffins, waffles, puffed wheat, toasted oat cereal, and cream of wheat (Table V) provide other selections to include more SF in the diet and yet keep the TDF intake in the range of 20–35 g a day as is now recommended (NCI 1984, Pilch 1987).

Cooked pasta products (Table VI) appear to retain a good portion of the SF initially present in the corresponding dry products; this does not, however, appear to be the case for white rice.

Cereal-based foods, including bakery foods, are a significant source of TDF. In several of these products, IF, rather than SF, is the predominant fiber fraction. IF provides protection against several disorders of the intestinal tract (Pilch 1987) and, thus, is a dietary essential. In contrast, in products where white flour is a predominant, if not the only, flour component, SF appears to be a significant component of TDF.

For individuals attempting to manage their hypercholesterolemic and/or diabetic condition, a variety of foods, as the data in Tables II–VI suggest, can be included to increase the level of SF in the diet.

Traditional foods can conveniently provide 8–10 g of SF, or about one-third of the recommended (NCI 1984, Pilch 1987) total fiber intake, to our daily diet; bakery products can easily contribute 3 g of SF. For some, this would necessitate some increase in their consumption of bakery products, but such an increase is well in line with the various dietary recommendations made in recent years (Cronin and Shaw 1989).

In a study recently completed (S. Riddell-Lawrence et al, *unpublished*), 5.5 g of additional SF (3 g from bakery products) in the diet caused a significant decrease in blood levels of both the total cholesterol and low-density lipoprotein cholesterol in hypercholesterolemic human subjects. Table VII provides one example of how 3 g of SF can be obtained from bakery products.

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