



## HEALTH BENEFITS OF SMART SNACKING



### SUMMARY

Nearly everyone – children, adolescents, and adults – eats or drinks between meals every day. Not only are more people snacking, but they also are snacking more frequently throughout the day than ever before. The popularity of snacking has raised questions regarding its impact on health.

Although research related to snacking should be interpreted cautiously given the lack of a universally accepted definition, certain trends are apparent, including the increased prevalence of snacking in recent decades. Snacks are often considered to be mostly energy-dense, nutrient-poor foods and beverages. However, many consumers today are seeking healthier snacks consistent with their focus on healthier lifestyles.

Healthy snacking can help increase the likelihood of meeting daily servings of food groups such as those recommended by the 2010 Dietary Guidelines for Americans and USDA's newly introduced MyPlate ([www.choosemyplate.com](http://www.choosemyplate.com)) – fruits, vegetables, grains, protein, and dairy. For example, 3 cups of fat-free or low-fat milk and milk products are recommended every day for Americans 9 years and older. Also, snacks can contribute to meeting recommendations for energy and essential nutrients, including potassium, dietary fiber, calcium, and vitamin D – nutrients of public health concern identified by the 2010 Dietary Guidelines. However, many snack foods are high in energy and contribute to excess discretionary calories as added sugars and fats. For this reason, nutrient-dense snacks consumed within daily calorie allowances are encouraged. Based on the current evidence, researchers have concluded that there is no compelling support for the suggestion that snacking causes overweight/obesity.

Milk and milk products (e.g., cheese, yogurt) are desirable snack choices because of their significant nutrient contribution to the diets of Americans, as well as their taste, versatility, and convenience. Dairy foods account for only 13% of between-meal snacks for people 2 years and older. Increasing dairy-based foods as snacks can be a strategy to help consumers meet recommended daily servings of dairy and nutrients provided by dairy, including some of those limited in their diets (e.g., calcium, vitamin D, potassium).

Recognizing increasing consumer demand for “better for you” snacks, the food industry has incorporated dairy foods and dairy ingredients into a variety of new snack products. For example, cheese, a nutritious snack on its own, can be used as an ingredient in dips, crackers, and other foods consumed as snacks. Also, adding milk protein to foods and beverages offered as snacks can help people looking to attain higher protein intakes.

Well-planned healthy snacks from the basic food groups provides energy and can help close nutrient gaps, and may help reduce between-meal cravings, take the edge off hunger, and prevent overeating at meals. The popularity of snacking presents opportunities for health professionals to help their clients choose nutrient-dense foods that fit within their calorie allowances and for the food industry to develop tasty, nutrient-dense snacks. **D**



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## INTRODUCTION

In today's "on-the-go," multi-tasking society, snacks are a central component of Americans' eating routines. In fact, snacking is a common practice for nearly all age groups and both genders (1-5). The NPD Group, a global provider of consumer and retail market research information, reports that 87% of U.S. consumers say they snack (6). Consumers spent more than \$93.5 billion on snacks in 2009, and sales of snacks are expected to continue to grow (6,7). Studies among U.S. children, adolescents, and adults reveal that snacking has increased appreciably in recent decades and that today snacks on average represent about a fourth of daily calories consumed (2-5).

The popularity of snacking has raised questions regarding its impact on consumers' health. Specifically, how does snacking affect the nutrient density of the diet, and does snacking lead to overweight/obesity? While unhealthy snack choices may undermine the nutritional value of a well-balanced diet and contribute to health problems, healthy snacks can help increase nutrient intakes. There is evidence that Americans are seeking and making healthier snack food choices (6,8).

This Digest presents an overview of snacking, health implications of snacking, dairy foods and foods containing dairy ingredients as healthful snacks, and tips for smart snacking. For the purpose of this review, snacking is assumed to be the consumption of foods or beverages between meals.

## AN OVERVIEW OF SNACKING

### **What's the Definition of Snacking?**

Based on a review of more than 100 studies about snacking and snacks, researchers concluded that there is no universally accepted definition of these terms (9). Snacking has been defined by a number of approaches including nutrient profiling (i.e., classification of foods based on their quality and composition), time of




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*Snacking is a common practice among all age groups in the U.S. Not only do most people today snack, but they are snacking more often throughout the day than in past decades.*

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consumption (i.e., foods consumed between traditional mealtimes or at times other than meals), food clusters (i.e., groups of foods consumed together), frequency of eating occasions (i.e., an implied definition of snacking), and individuals' perception of snacking (i.e., consumers' self-described definition of snacks and snacking) (9).

A study of 122 undergraduate students demonstrated that food cues (e.g., nutritional quality of food, portion size, perceived healthfulness, preparation time) and environmental cues (e.g., eating with the family vs. eating alone, the quality of napkins and plates) influenced whether they considered an eating occasion to be a meal or a snack (10). Some consumers may define a snack as a certain type of food, particularly foods of low nutritional value (e.g., cookies, potato chips), whereas others may refer to snacks as foods eaten at a certain time of day. What constitutes a snack to one individual could be considered a meal by another.

The use of different definitions of snacking and snacks in studies attempting to define the health effects of snacking has resulted in no clear consensus on the effects of snacking and therefore on the development of science-based snacking recommendations for consumers (9).

**Prevalence of Snacking.** Findings from nationally representative surveys of food intake in the U.S. show that not only are more people snacking, but they are also snacking more often (1-5). According to data from *What We Eat in America* (WWEIA), the dietary intake component of the National Health and Nutrition Examination Survey (NHANES) 2005-2006, the percentage of adolescents snacking on any given day increased from 61% in 1977-78 to 83% in 2005-06, and the mean frequency of snacking rose significantly from 1.0 to 1.7 times/day (2). During this same time period, the percentage of adolescents who consumed three or more snacks a day increased more than twofold (i.e., from 9% to 23%). A similar trend is shown for adults (3). Data from WWEIA, NHANES 2007-08 indicate that the percentage of adults aged

20 years and over who snacked on any given day increased from 59% to 90% between 1977-78 and 2007-2008 and the frequency of daily snacking doubled (i.e., from 1.0 to 2.2 times/day) during this period (3). In 2007-08, about two-thirds of adults (65%) snacked two or more times a day, whereas in 1977-78 most adults (73%) snacked only once or not at all (3). In these surveys, snack occasions were reported by respondents as distinct eating occasions consisting of at least one food or beverage item, including water (2,3).

**What, When, Where, and Why**

**America Snacks.** Foods and beverages consumed as snacks vary widely, ranging from those that have a low nutrient to energy ratio such as sweetened beverages and savory snacks (e.g., potato chips, crackers, candies, cookies, cakes, and pastries) to those providing a significant amount of nutrients relative to calories such as low-fat and fat-free milk and other dairy foods (e.g., cheese, yogurt), nuts and seeds, fruits and fruit juices, vegetables, and lean meats (2,3). Over the years, snacks with a low nutrient to energy ratio have increased the most. When the types of snacks consumed between 1989-91 and 2003-06 by children and adolescents aged 2 to 18 years were examined, it was found that children increased their intake of energy-dense salty snacks and candies, fruit drinks, and sports drinks as sources of energy; desserts (e.g., cookies, cakes) remained a major snack source; and fresh fruit decreased (4). In 2006, sweetened beverages were the third largest contributor to snacking energy (4). A similar study in adults showed an increase in salty snacks, candies, nuts/seeds, alcoholic beverages, and sports drinks as a source of energy from snacks and a decrease in overall desserts, milk/dairy, and juices/fruits (5).

The good news is that, consistent with the public's interest in increasing the healthfulness of their diets (11-13), many consumers are turning to healthier snacks (6,8,14,15). A recent comprehensive market survey of snacking behavior and motivation conducted for the Innovation Center for U.S. Dairy® found that half of consumers



*Awareness of what foods and beverages are chosen as snacks, and when, where, and why people snack can help develop recommendations for healthy snacking.*



snacked (51%) to meet nutrition needs, whereas 49% of consumer snacking related to “fun munching” snacks (e.g., salty and/or sweet indulgent snacks) (6). This trend toward more nutritious snacks is reflected by the increased demand for yogurt as a snack food (6).

Although most snacking occurs in the afternoon and evening (6,14), snacking in the morning is on the upswing (16). A 2010 survey conducted by the American Dietetic Association/American Dietetic Association Foundation showed that children snack throughout the day (17), which can provide many opportunities for parents and schools to offer children nutrient-rich snacks.

Food and beverage snacks are ubiquitous. The majority (78%) of snacks are consumed at home, with 22% away from home (6). Although traditional retail outlets such as grocery stores are the main source of snacks (6), more than ever snacks are now being obtained from restaurants (18). Snacks, especially energy-dense, low-nutrient foods and beverages, are widely available in retail stores whose main business is not food, such as pharmacies and gasoline stations (19). Snacks are also available at school (20).

Where snacks are obtained may influence the healthfulness of snacks chosen (21). A study showed that low-income children in grades 4 through 6 frequently purchased snacks, particularly energy-dense, low nutrient foods and beverages such as chips, candy, and sweetened beverages before and after school at nearby urban corner stores (21). Also, a study of 1,577 pre-teens found that 69.2% of the students snacked while watching TV, and that at least half (53.2%) of the students consumed less healthful foods (e.g., salty foods) while watching TV (22). Nutrient-dense choices such as milk and juice made up less than one quarter (24.1%) of total beverages consumed (22).

People snack for a variety of reasons such as to relieve hunger, but also because of the availability of snacks, psychological/emotional stimuli (e.g., boredom, comfort, reward, stress relief, a fun experience), or in response to a number of cultural or social cues (e.g., while watching TV) (9,15). A review of recent studies shows that parental

restriction of palatable or desirable snack foods in an effort to reduce consumption of calories and prevent obesity in children is likely to be counterproductive, leading children to eat in the absence of hunger and increase their intake of such snack foods (9). To make effective recommendations regarding snacking, researchers suggest that more research is needed to understand what motivates consumers to snack (9).

## HEALTH IMPACT OF SNACKING

**The Contribution of Snacking to Food Group Recommendations and Nutrient Intakes.** Snacking can help increase the likelihood of meeting national food group recommendations such as USDA's newly introduced MyPlate ([www.choosemyplate.gov](http://www.choosemyplate.gov)), formerly MyPyramid (1,2,23). Studies using MyPyramid show that, for both men and women, average total daily intakes of fruits, vegetables, and dairy fall short of meeting recommendations, whereas average intake of calories from solid fats and added sugars exceeds recommended limits (1). When researchers examined associations between snacking and intakes of MyPyramid food groups and components using NHANES 2007-2008 data in 5,334 adults age 20 years and over, they found that snacks provided from 7 to 38% of adults' total daily intakes of MyPyramid food groups, 23-24% of calories, 17% of solid fats, and 41% of added sugars (1). A similar study in adolescents using NHANES 2005-2006 data showed that snacks provided from 11 to 38% of their total daily intakes of MyPyramid food groups, 27% of discretionary calories, 20% of solid fats, and 34% of added sugars (2). Although snacking more often increased adults' total intakes of most MyPyramid food groups and components, it was mainly explained by consuming more food, not making healthier choices (1). Snacking enhanced intake of some MyPyramid food groups for adults and adolescents, but it also contributed to intake of excess discretionary calories as added sugars and fats.



*Traditionally, snacks have been considered to be primarily indulgent foods (e.g., energy-dense, nutrient poor), whereas today there is an increased demand for and availability of healthier nutrient-dense snack choices.*



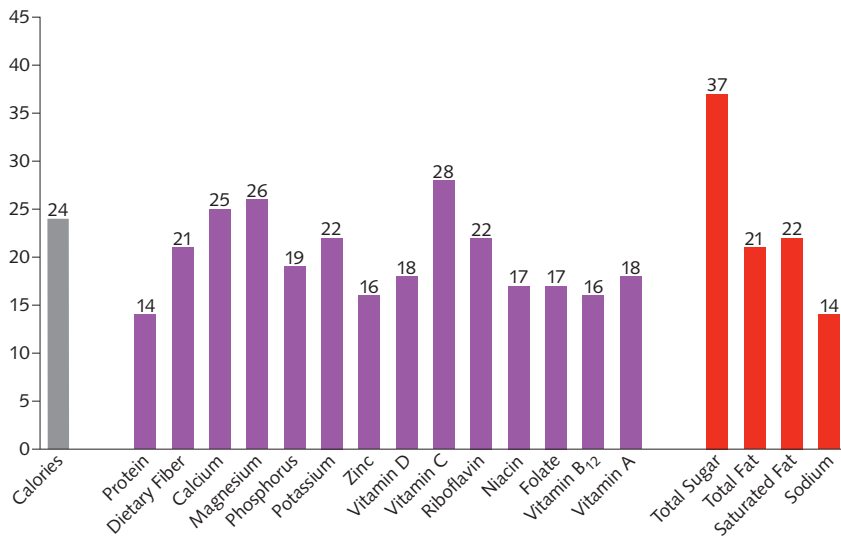
Snacks contribute not only energy, but also can increase intakes of essential nutrients for all age groups, according to recent reviews of the scientific literature (9,24). The 2010 Dietary Guidelines Advisory Committee Report, based on its review, concluded that "a limited body of evidence supports a positive relationship between snacking and increased nutrient intake in children, adolescents, adults, and older adults..." (24).

On average, snack foods and beverages contribute 24% of daily caloric intake – a daily average of 586 calories for men, 421 calories for women, and 526 calories for adolescents (2,3,25, Figure). Adults aged 60 years and over consume fewer calories at snacking occasions and overall (3). For older adults, many of whom experience "anorexia of aging" (i.e., decreased appetite and energy intake), snacking can help increase their intake of energy and some essential nutrients (26,27). Also, for athletes, the calories and nutrients such as protein provided by snacks may help meet their nutritional needs during training and competition, and replenish losses during recovery (28). For athletes participating in high physical activity, it is important to meet energy and macronutrients needs, especially carbohydrate and protein, to help maintain body weight, replenish glycogen stores, and repair tissue (29). Adequate intake of food and fluid before, during, and after exercise helps maintain blood glucose levels during exercise, maximize performance, and improve recovery (29).

The 2010 Dietary Guidelines for Americans identifies potassium, dietary fiber, calcium, and vitamin D as nutrients of public health concern for both adults and children (30). In addition, several other nutrients such as vitamin A, vitamin C, folate, vitamin K, and magnesium are identified as being under-consumed by certain subgroups of the population (24,31). Data from WWVIA, NHANES 2007-08 show that for males and females 2 years and older, snack foods and beverages contribute 24% of calories, but lower percentages of total daily intake for many nutrients (ranging from 14-22%) and higher percentages for only a few nutrients

(25-28%) (25, Figure). With respect to nutrients of public health concern, snacks contribute 22% of Americans' daily intake of potassium, 21% of dietary fiber, 25% of calcium, and 18% of vitamin D (25, Figure). These data show the potential of using snacking occasions to make healthy choices to increase and balance nutrient intakes with energy intake.

**Figure: Contribution of Food and Beverage Snacks to Total Daily Intake of Calories and Select Nutrients for Males and Females Two Years and Older in the U.S., 2007-2008 (25)**



**Snacking's Impact on Risk of Overweight/Obesity.** The reported rise in snacking in recent decades (4,5) concurrent with the dramatic increase in overweight/obesity in the U.S. (32) has led to the intuitive notion that snacking is an important cause of overweight/obesity. However, findings suggesting that snacking is associated with overweight/obesity are inconsistent (9,24).

In a longitudinal study in Spain, which followed over 10,000 middle-aged men for an average of 4.6 years, self-reported snacking was significantly associated with increased risk of substantial weight gain (33). An 8-year study of over 9,000 normal weight and overweight adults in the Netherlands found some, but inconsistent, evidence that consuming energy-dense snack foods was positively associated with an increase in annual body weight (34). Findings of an 8-week clinical trial among 16 men and 66 women in the Netherlands which investigated the effects of mandatory

*Snacking can help meet national food group recommendations and intakes of essential nutrients, especially those under-consumed.*

snack intake (high and low energy-density, with or between meals) on changes in body weight, led the researchers to conclude that "consuming snacks that are high or low in energy density does not necessarily contribute to weight gain" (35). A recent systematic review of the scientific literature on snacking and body weight concludes that the evidence fails to provide compelling support for the suggestion that snacking causes overweight or obesity (9).

Likewise, the same review, which also examined the relationship between frequency of eating (a surrogate definition of snacking) and overweight/obesity, concluded that "increased frequency of eating is not associated with body weight and/or other parameters of obesity and may, in fact be beneficial in this regard" (9). For example, snacking more frequently, despite its relationship with higher total calorie intakes, was not associated with body mass index in U.S. adolescents (2). Neither snacking nor frequency of eating was associated with overweight/obesity, despite their association with energy intake, in a recent study of 1,099 middle-aged women (36).

There is some evidence that eating frequency and snacking may have a beneficial effect on body weight (9,37,38). According to research presented at a symposium on the effects of eating frequency, snacking, and skipping breakfast on energy regulation, consuming six meals/day may improve appetite control relative to three meals/day (37). In another study which examined the association between snacking frequency and overweight/obesity among 5,811 adolescents using 24-hour dietary recalls from NHANES 1999-2004, researchers found that adolescents who consumed two or more snacks/day were less likely to be overweight or have abdominal obesity despite increased energy intake from snacks than those who did not snack (38).

Inconsistencies in the literature regarding the impact of snacking on overweight/obesity may be explained by differences in definitions of snacking and study designs, other lifestyle factors associated with snacking, and underreporting of snacking. To address the issue of snacking and body weight and provide support for specific

recommendations for snacking to help manage body weight, researchers are calling for further studies (9,34,38).

## DAIRY FOODS AND FOODS CONTAINING DAIRY INGREDIENTS AS HEALTHFUL SNACKS

Milk and milk products (cheese, yogurt) are tasty, versatile, convenient foods that make significant nutrient contributions to the diets of Americans (24,30,31), which supports their use as desirable snack choices. According to data from NHANES 2003-2006, intake of dairy foods (milk, cheese, yogurt) contributes only 10% of the daily calories in Americans' diets on average, yet provides a significant percent of many essential nutrients, including 16% of potassium, 51% of calcium, and 58% of vitamin D – nutrients of public health concern identified by the 2010 Dietary Guidelines for Americans (30,39). The Dietary Guidelines recommends increased intake of foods such as vegetables, fruits, whole grains, and low-fat and fat-free milk and milk products to help meet needs for the above nutrients as well as dietary fiber, another nutrient of public health concern (30). Milk is the number one food source of calcium, potassium, and vitamin D in the American diet (39,40). Unfortunately, most children and adults are not consuming the Dietary Guidelines' recommended amounts of milk and milk products – 3 cups of low-fat or fat-free milk and milk products every day for Americans 9 years and older, 2½ cups for children 4 to 8 years, and 2 cups for children ages 2 to 3 (30,41). A recent report from the U.S. Centers for Disease Control and Prevention indicates that among children and adolescents who drink milk, most (78%) do not consume low-fat (1%) or fat-free milk, the types of milk recommended by the 2010 Dietary Guidelines (30) and the American Academy of Pediatrics (42).

Adding just one more serving of low-fat or fat-free dairy a day can help meet the 2010 Dietary Guidelines' recommendations for dairy food intake and help close some of the nutrient gaps in Americans' diets (43). Dairy products, either stand-alone or as a component of a snack, account for only 13% of all between-meal snacks for people



*Low-fat and fat-free milk and milk products (e.g., cheese, yogurt) and foods containing dairy ingredients (e.g., milk protein), by delivering great taste and nutrition, align with consumers' demand for nutritious snacks that taste good.*



2 years and over; 18% for children 2 to 8 years (6). Increasing intake of dairy-based snacks can be a strategy to help consumers meet recommended dairy servings and recommended intakes of nutrients, particularly those that are limited in their diets. Recognizing that children need protein, vitamins, and minerals, especially calcium and phosphorus, to build strong bones and teeth, the American Academy of Pediatric Dentistry includes dairy foods such as cheese, yogurt, and chocolate milk among its recommended nutritious snacks (44).

There are numerous examples of nutrient-dense dairy snacks, including low-fat and fat-free white and flavored milks, low-fat cheeses, and low-fat and fat-free yogurts that are available as yogurt shakes, yogurt drinks, yogurt-in-a-tube, and Greek yogurt. Also, dairy foods can be combined or paired with other foods as tasty, nutritious snacks. Examples include low-fat milk mixed with fresh fruit and frozen in a popsicle container; individual portions of cheese in a variety of flavors packaged with whole grain crackers; cheese mixed with popcorn or pretzels; cheese and apple slices; and smoothies of blended yogurt and fresh fruit.

As consumers increasingly seek healthier foods and beverages, including snack options that fit within their nutrition intake goals (6,11-13), there is a growing market for "better-for-you" snack options that do not compromise taste or a sense of indulgence (7,15). To help meet this demand, dairy and dairy ingredients such as milk protein are being incorporated into snack products (45,46). For example, while yogurt itself is a nutritious snack, it also can be used as an ingredient such as a base for dips for vegetables (46). Likewise, cheese, a nutritious dairy food, can be used as an ingredient in dips, crackers, and other foods consumed as snacks (46).

More than one-third (39%) of consumers say they are trying to consume more protein, according to a recent survey of consumer attitudes toward food safety, nutrition and health (11). Diets higher in protein have been shown to increase satiety or feelings of fullness (47,48). In a recent survey of 495 adults, 86% of respondents agreed that protein provides a feeling

of fullness (49). Research shows that milk proteins may have a unique role in contributing to weight management (50).

Milk proteins are of particular interest as an ingredient in snack foods and beverages because they can boost the protein content of foods to help people attain higher protein diets. A recent food expo displayed a variety of prototype snacks with milk proteins, including an on-a-stick frozen snack containing milk, milk protein concentrate, and whey protein; a high protein, lower sodium bite-sized breakfast snack; a high protein caramel for use in nutrition and energy bars; and a yogurt-based beverage containing high quality milk proteins and probiotics (46,51).

## TIPS FOR SMART SNACKING

Well-planned healthy snacks provide energy and essential nutrients, especially nutrients of public health concern, and may help reduce between-meal cravings, take the edge off hunger, and prevent overeating at meals. The following are some tips for smart snacking (24,30,52):

- Choose a variety of nutrient-dense snacks from the MyPlate food groups – fruits, vegetables, grains, protein, and low-fat and fat-free dairy. Also, limit intake of foods high in solid fats, added sugars, and salt.
- Make snacks count toward food group servings. Increase foods as snacks that are consumed below recommended amounts such as vegetables, fruits, whole grains, and low-fat and fat-free dairy.
- Keep your daily calorie limit in mind when choosing snacks.
- Pay attention to serving sizes and avoid oversized portions of snacks.
- Plan ahead. Pack grab-and-go healthy snacks such as fruit, vegetables, nuts, whole-grain crackers, and cheese for your lunchbox, backpack, or briefcase, and have perishable snacks such as milk and yogurt in your refrigerator for at-home snacks.
- Avoid mindless or indiscriminant snacking (i.e., eating or drinking, usually on energy-dense, nutrient poor foods and beverages, without thinking or while doing something else such as watching TV).



*Snacks' popularity and the growing demand for "good-for-you" snacks provide opportunities for health professionals to help their clients choose nutrient-dense snacks from the major food groups and for the food industry to develop tasty, nutritious snacks.*



## CONCLUSION

Clearly, daily snacking is a common practice among Americans and one that is growing. Although much remains to be learned about snacking, including its definition and evidence-based guidelines for healthy snacking, health professionals can play a key role in helping their clients choose healthful, nutrient-dense snacks from the major food groups – fruits, vegetables, grains, protein, and dairy – that fit into their calorie allowances. USDA's MyPlate is a reminder to eat smart at every snack. Consumers' interest in healthier diets provides an opportunity for food manufacturers to develop tasty, nutrient-dense snacks and for establishments that sell snacks (e.g., local stores, restaurants, schools) to carry healthy snacks. **D**

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## RELATED RESOURCES

### [www.nationaldairycouncil.org](http://www.nationaldairycouncil.org)

- National Dairy Council. Dairy Foods: A Major Nutrient Contributor to Americans' Diets. *Dairy Council Digest* 82 (5), 2011 (under Research, Dairy Council Digest Archives).
- National Dairy Council. The Role of Protein in Satiety & Weight Management. *Dairy Council Digest* 80 (5), 2009.
- 33 Tasty Snack Ideas (under Child Nutrition Health Education Kit).

### [www.innovatewithdairy.com](http://www.innovatewithdairy.com)

- Get Your Share of Snack Time (brochure).

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