

food Insight™

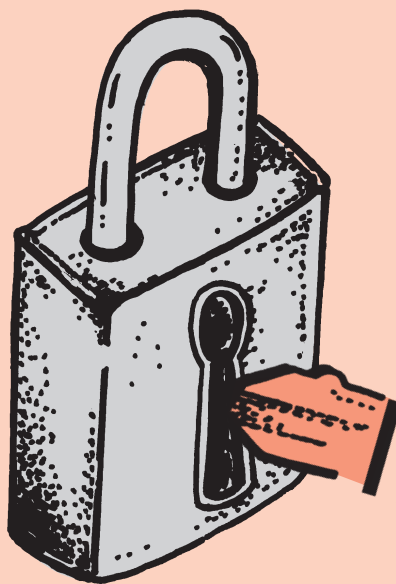
Current Topics in
Food Safety and Nutrition

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The Ins and Outs of Insulin Resistance

Although scientists have intensely studied insulin resistance for four decades, its link to conditions such as obesity, cardiovascular disease, hypertension, and diabetes has recently landed it squarely in the media spotlight. Despite this heightened focus, there's still a lot to learn as scientists attempt to uncover new knowledge about insulin resistance and its effects on health. Until then, the questions and answers below provide a brief overview about what is known to date.

What is insulin resistance?

To better understand insulin resistance, let's review some basic biochemistry. Insulin is a hormone produced by the islet cells of the pancreas. When blood glucose (blood sugar) rises after food is eaten, the pancreas pumps out insulin, whose job is to shuttle glucose into cells, where glucose is used for energy or stored as glycogen.

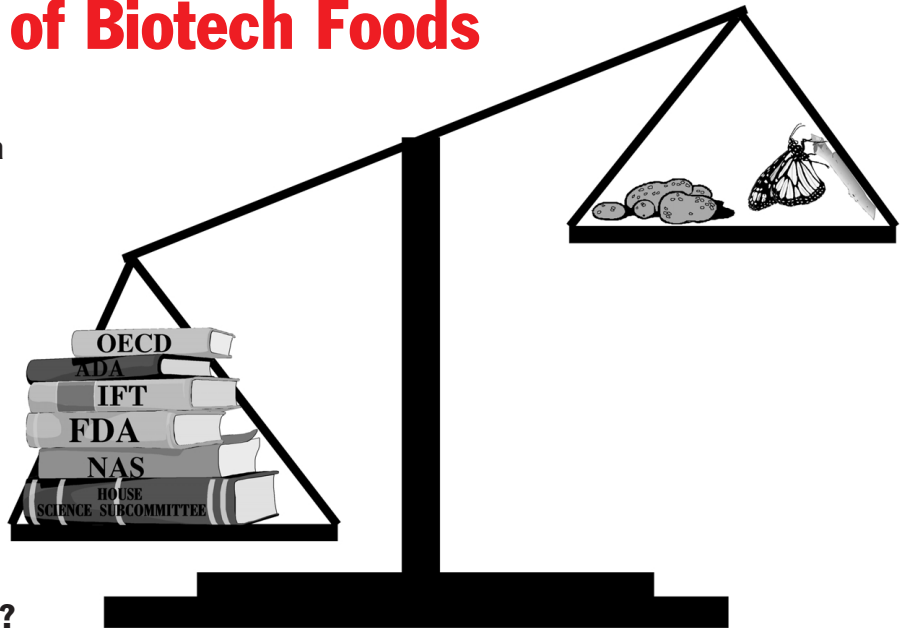
To do its job, insulin must fit like a key into receptors lining the outside of the cell. Each cell contains 20,000 or more insulin receptors. Once inserted in the cell's receptors, insulin activates an enzyme in the receptors called tyrosine kinase. This triggers a series of events that allows glucose to enter the cell. With insulin resistance, the cells "resist" this process, so instead of entering the

cell, glucose builds up in the blood. The pancreas responds by pumping out higher than normal levels of insulin in an attempt to reduce blood glucose to normal levels.

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The Weight of the Evidence: Assessing the Safety of Biotech Foods

Recently, food biotechnology has become a hot topic in the United States, with much interest focused on the safety of these foods. This has attracted major attention from media, from consumers, and from activist groups. But what is food biotechnology? What benefits do these foods bring to us? What foods are produced using biotechnology practices? And most importantly, are these foods safe?



With all of the recent attention, it may appear that food biotechnology just magically appeared on the marketplace.

In fact, modern biotechnology has been around for a decade and is naturally evolving as farmers learn to grow better crops. Modern methods of farming are more reliable and more precise.

As an example, food biotechnology is the practice of taking a gene with a desirable benefit from one plant and removing it or inserting it into another to produce a better product. Crops can produce their own pesticides to reduce the need for insecticide sprays. Potatoes can be grown with a higher starch content—this means potatoes will absorb less oil when they are fried. Vegetables can be developed with delayed ripening qualities that improve their taste and freshness. And fruits and vegetables can be enhanced to have higher nutritional value.

Among some activist groups, however, food biotechnology is portrayed as something to be afraid of. They object to these food production methods, claiming

it is “messing with Mother Nature” or creating new species of plants and animals that will be detrimental to the environment.

Are they correct? Is food biotechnology something of which we should be frightened?

No, not according to three recently released studies. The National Academy of Sciences (NAS), the Organization for Economic Cooperation and Development (OECD), and the Subcommittee on Basic Research of the U.S. House of Representatives Committee on Science all released independent reports espousing the safety of food biotechnology. All the reports agree that foods produced through biotechnology are safe for consumers. In addition, the U.S. Food and Drug Administration reaffirmed the safety of biotech foods with their recent announcement on proposed rules for biotech food.

The report of NAS’s National Research Council supports claims of safety for biotech foods and emphasizes that it is “not aware of any evidence that foods on the market are unsafe to eat as a result of genetic modification.” The National Research Council found that no

strict distinction exists between the health and environmental risks posed by products of agricultural biotechnology and those posed by conventional breeding practices. The NAS report also focused on safety concerns about agricultural biotechnology related to health, the environment, and pest resistance. The report concluded that public confidence and understanding of biotech foods could be improved with a more open and accessible regulatory process.

The OECD recently held a conference in Edinburgh, Scotland to discuss various aspects of food biotechnology. One of the most important issues addressed at the conference was the safety of foods grown using biotechnology methods. The conference report stated that while biotech foods have been in the marketplace in many countries for years, no adverse effects on human health have been reported. The OECD report points out the potential health benefits of biotech foods for consumers, including improved nutritional quality, edible vaccines, and reduced pesticide levels.

In April, a subcommittee of the U.S. House of Representatives Committee on

Science released a report that assessed the safety and benefits of agricultural biotechnology. This report of the Subcommittee on Basic Research, in addition to highlighting the numerous benefits of biotechnology, stated that agricultural biotechnology poses no unique risks to human health. In fact, its research found that the methods used in agricultural biotechnology might actually place food producers in a better position than food processors who use traditional farming practices to assess safety. Traditional crossbreeding methods transfer thousands of unwanted genes, whereas modern biotechnology can transfer with greater precision only the desired traits to produce a better crop.

Scientific evidence, government studies, and independent research sup-

porter of Food and Drugs, reaffirming FDA's long-held position that foods produced through biotechnology are safe, said "FDA's scientific review continues to show that all bioengineered foods sold here in the United States today are as safe as their nonbioengineered counterparts."

FDA has proposed a rule that formalizes the consultation process. The rule mandates that developers of biotech foods and animal feeds notify the agency when they intend to market such products. FDA will also require that specific information be submitted to help determine whether the foods or animal feeds pose any potential safety, labeling, or adulteration issues. This information also will be posted on the FDA website for easy viewing to make sure that con-

"FDA's scientific review continues to show that all bioengineered foods sold here in the United States today are as safe as their nonbioengineered counterparts."

port the safety of food biotechnology. There have been no reported cases in which human health was jeopardized by the consumption of foods produced through biotechnology.

Three government agencies monitor the development and testing of biotech food crops: the U.S. Food and Drug Administration (FDA), the U.S. Department of Agriculture, and the Environmental Protection Agency. These agencies work together to ensure that biotech foods are safe for the public.

On May 3, 2000, FDA announced its intention to build upon programs already under way at the agency to continue to ensure the safety of all foods, including foods developed through biotechnology. FDA's Jane E. Henney, MD, Commis-

sioner have access to important product information.

FDA also plans to draft labeling guidance to assist manufacturers who wish to voluntarily label their products that are made with or without the use of ingredients produced through biotechnology. The guidelines will help ensure that labeling is truthful and informative.

In addition to agency regulation, the companies that produce these foods conduct their own safety tests. Although the absolute safety of any food can never be guaranteed, consumers should rest assured that biotechnology remains one of the most extensively researched and reviewed agricultural developments in history. Extensive scientific research clearly indicates that biotech foods are safe.

What is food biotechnology?

Food biotechnology uses what we know about genetics to improve food and how we produce it. Genes are responsible for traits like a person's eye color or a vegetable's taste. For example, using modern biotechnology, scientists can move genes for valuable traits from one plant or cell into another plant. In this way they can make a plant taste or look better, be more nutritious, protect itself from insects, or produce more food.

What are the benefits of biotechnology?

Biotechnology can help protect the environment by producing crops that are more resistant to disease and whose production requires smaller amounts of chemicals; help crops ward off harmful insects or tolerate herbicides, which results in hardier plants and greater crop yields; and produce better-tasting, fresher, and more nutritious foods.

What can we expect in the future for biotechnology?

Farmers will be able to grow more food on less land, scientists will be able to detect plant viruses and bacteria in foods earlier and more accurately than they can now, and we can expect more healthful foods in the future.

The full reports mentioned in this article are all available on-line:

National Academy of Sciences report:
www.national-academies.org

Organization for Economic Cooperation and Development report:
www.oecd.org.

U.S. House of Representatives Committee on Science report:
www.house.gov/science

FDA press release announcing the proposed rule on biotech foods:
<http://www.fda.gov/bbs/topics/NEWS/NEW00726.html>

The Ins and Outs of Insulin Resistance

Continued from page 1

What causes insulin resistance?

Researchers are not sure yet, although some believe that insulin resistance is caused by a defect in certain genes or by genetic impairments down the insulin signaling pathway. According to Gerald Reaven, MD, professor of medicine at the Stanford School of Medicine, about 50 percent of a person's degree of insulin resistance can be attributed to genetics

“We don't know why only a subgroup of those with insulin resistance goes on to develop diabetes...”

and 50 percent can be attributed to lifestyle factors. For example, obesity, physical inactivity, and smoking all increase the degree of insulin resistance.

What are the symptoms?

There are no outward symptoms of insulin resistance, but the condition is characterized by high circulating insulin levels and, sometimes, impaired glucose tolerance, which can be measured through a glucose tolerance test.

How common is insulin resistance?

Nearly everyone with type 2 diabetes is insulin resistant, and at least 25 percent of people with normal glucose tolerance are estimated to be severely insulin resistant but can secrete enough extra insulin to overcome the resistance. In the United States, the increasing prevalence of obesity and physical inactivity, both of which aggravate insulin resistance, has focused more attention on this condition.

That sounds like a lot of people. Should everyone be screened for insulin resistance?

No, says James Hill, PhD, director of the Center for Human Nutrition at the University of Colorado Health Sciences Center in Denver. “We don't yet know enough about insulin resistance to recommend population-wide screening and testing,” says Hill. Besides, a simple screening test is not available and clear-cut laboratory values for the classification of insulin resistance do not exist, says Ann Coulston, MS, RD, a former American Dietetic Association president and Woodside, California-based nutrition consultant who conducted research on insulin resistance at Stanford University Hospital.

Will everyone with insulin resistance develop diabetes?

No. About 25 percent of people with insulin resistance eventually develop type 2 diabetes. This occurs when the islet cells in the pancreas either become abnormal or stop working because they cannot keep up with the increased demand for insulin.

“We don't know why only a subgroup of those with insulin resistance goes on to develop diabetes,” says Robert Sherwin, MD, professor of medicine at Yale University in New Haven, Connecticut, and president-elect of the American Diabetes Association. “We do know that maintaining a healthy weight and participating in regular physical activity help reduce insulin resistance and the chance of developing diabetes.”

What role does insulin resistance play in heart disease?

The high blood insulin levels that characterize insulin resistance lead to a clustering of heart disease risk factors in certain people. These risk factors, commonly called Syndrome X, include visceral obesity (excessive fat in the abdominal region), glucose intolerance, high triglyceride levels, low high-density lipoprotein (HDL) (“good”) cholesterol levels, and

high blood pressure. According to the American Heart Association, people with Syndrome X are at increased risk of coronary artery disease.

Reaven, whose research led him to first identify the concept of Syndrome X in 1988, says that more recent research has identified additional heart disease risk factors associated with insulin resistance. These include the presence of smaller, denser low-density lipoprotein (LDL) (“bad”) cholesterol particles, increased levels of lipids in blood after eating, high uric acid levels, and high levels of plasminogen activator inhibitor type-1, which reduces the ability to break up blood clots. “With insulin resistance, risk for heart disease is a bigger problem than risk for diabetes,” says Reaven.

Does eating carbohydrates cause obesity by driving up insulin levels, thus promoting fat storage?

According to some popular diet books, eating carbohydrates stimulates the pancreas to pump out too much insulin, especially in people who are insulin resistant. Authors of these books believe that the increased insulin levels promote the

“With insulin resistance, risk for heart disease is a bigger problem than risk for diabetes,”

conversion of carbohydrates into fat, which is then stored as body fat.

This theory is flawed. First, although it is true that one of insulin's roles is to promote fat storage in the body, it plays this role only when too many calories are eaten, not when calories are in balance.

“Insulin cannot make you fat—too many calories make you fat,” says Reaven. “Insulin is a hormone, and hormones can’t produce calories. The notion that either carbohydrates or insulin causes weight gain is a fantasy.”

In addition, the body uses carbohydrates before it uses fat. If too many calories are eaten, the body will store excess calories from fat first, not those from carbohydrates.

Should insulin-resistant people eat fewer carbohydrates?

To date, only a few intervention studies have been performed with humans to

investigate the optimal carbohydrate intake for insulin resistance. Of those studies conducted, the findings are not consistent. How do the experts’ recommendations compare to current public health guidelines suggesting that 55 percent or more of daily calories come from carbohydrates?

“If you are insulin resistant, eating large amounts of carbohydrates will cause increased insulin secretion,” says Reaven. “The increased insulin causes triglycerides to rise, HDL cholesterol to decrease, and LDL particles to become more atherogenic, which raises risk for

heart disease.” To blunt these responses in the insulin resistant, Reaven recommends a diet that comprises 45 percent carbohydrates and 40 percent fat (mostly monounsaturated and polyunsaturated). Coulston advises a diet of 50 percent carbohydrates and 30 to 35 percent fat.

Hill says the scientific evidence does not support recommendation of a lower-carbohydrate, higher-fat diet for insulin resistance. “We know that obesity aggravates insulin resistance. When you replace carbohydrates with fat, it’s easier to eat too many calories,” says Hill, who advocates a calorie-controlled, high-carbohydrate, low-fat diet. “People tend to be

more successful at losing or maintaining their weight

when they follow this approach.”

Reaven says a high-carbohydrate diet is “wonderful” if it promotes weight loss because that reduces insulin resistance, but maintains that the moderate carbohydrate intake that he recommends is better because it raises HDL cholesterol levels and lowers triglyceride levels, thus promoting heart health.

What’s the best way to reduce insulin resistance?

Here the experts agree: The most powerful steps for reducing insulin resistance are to achieve and maintain a healthful body weight and engage in regular physical activity.

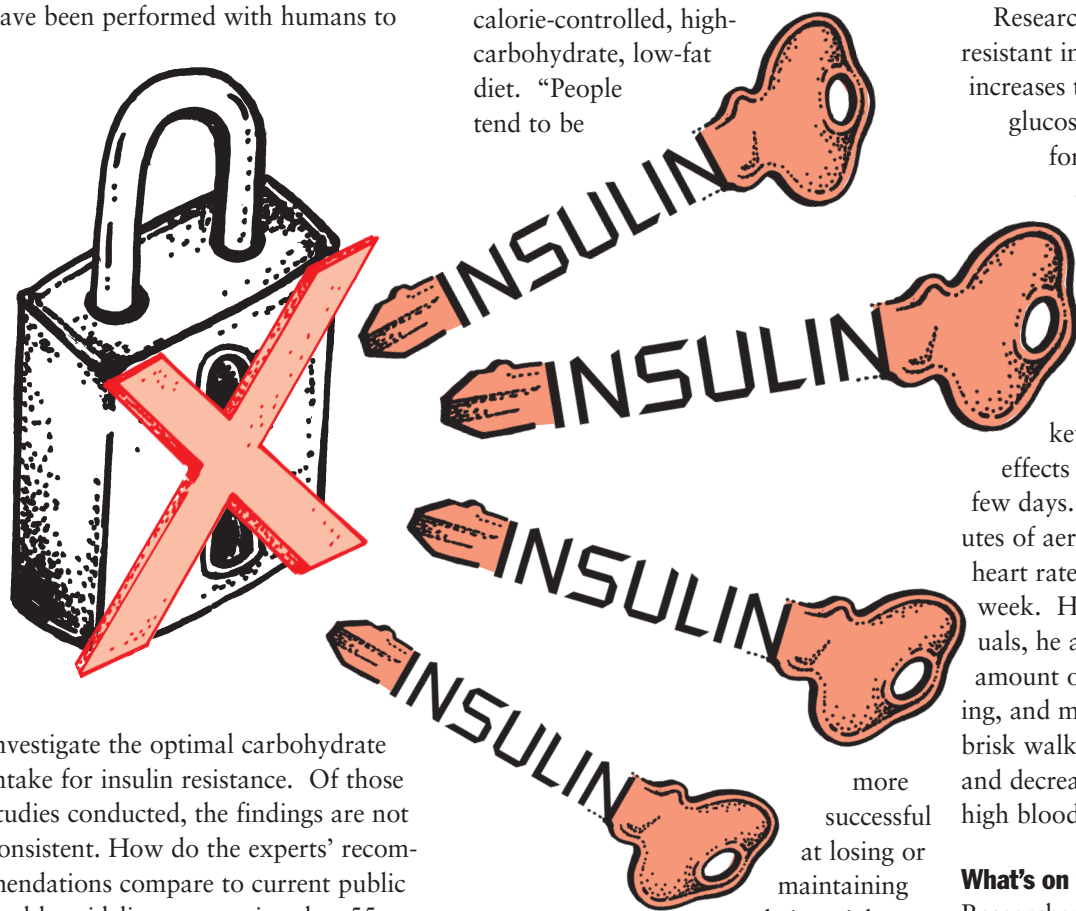
“Losing weight increases insulin sensitivity and decreases blood insulin and triglyceride levels,” says Coulston. “An overweight person can start to see improvements with even a 10-pound weight loss.” However, weight loss must be maintained to sustain these improvements.

Research shows that, among insulin-resistant individuals, physical activity increases the ability of insulin to bring glucose into muscle cells and use it for energy. Most intervention studies have examined the effects of aerobic exercise, but some studies show that resistance training also brings about positive effects.

Regular physical activity is key, though, or the positive effects begin to disappear within a few days. Sherwin recommends 30 minutes of aerobic exercise that elevates the heart rate to a desirable level 4 days per week. However, for sedentary individuals, he acknowledges that, “Any amount of activity is better than nothing, and more moderate exercise such as brisk walking improves insulin sensitivity and decreases risk for heart disease and high blood pressure.”

What’s on the research horizon?

Researchers are examining the genetic factors that may help provide an understanding of the causes of insulin resistance and help target specialized therapies for subpopulations such as members of particular ethnic groups, postmenopausal women, and children. Stay tuned as more of the answers to the questions surrounding this complex condition continue to unfold.



NewsBites

Brighter Consumer Outlook on Food Biotechnology

Positive consumer attitudes regarding biotechnology are back on an upward trend after a slight slump last fall. This is according to the latest International Food Information Council (IFIC) survey, conducted from May 5 to 9, 2000 by Wirthlin Worldwide. Since October 1999, consumers are somewhat more likely to buy foods that have been enhanced to "taste better or fresher" (54 percent), or foods that have been modified for insect protection and to require less pesticide spray (69 percent).

The survey was conducted just after the U.S. Food and Drug Administration (FDA) reaffirmed that it would not require mandatory labeling of foods produced through biotechnology. According to the IFIC survey, nearly two out of three (69 percent) consumers support the FDA's labeling policy. This confidence in the FDA position has remained relatively stable over the past 3 years, despite increasing controversy about food biotechnology.

Eighty-seven percent of consumers surveyed agreed that education through toll-free numbers, brochures, and websites would provide better sources of information than food labels. FDA has responded well to consumer opinion, as evidenced by its recent proposed rules to maintain the current voluntary labeling policy for biotech foods.

Although unfounded fears about agricultural biotechnology have received attention, three out of five consumers believe that they will benefit from biotechnology within the next 5 years. Indeed, scientific evidence supports the safety and many benefits of agricultural biotechnology. The research results can be accessed at <http://ificinfo.health.org/press/brighteroutlook.htm>.

It's Safe to Bite When the TEMPERATURE IS RIGHT!

Don't let your eyes deceive you. Consumers need to rely on more than the color of cooked meat to know when it is ready to be served and eaten. But how do you know if that juicy, luscious burger is ready to be smothered in ketchup and slapped on a bun?

Thermy™ to the Rescue!

Thermy™ is the centerpiece character of a new food safety education campaign developed to promote the use of food thermometers by the Food Safety and Inspection Service of the U.S. Department of Agriculture (FSIS/USDA). Food thermometers should be standard equipment in every consumer's kitchen. They help ensure that food is cooked to a safe interior temperature and prevent overcooking. According to the results of a 1998 Consumer Food Safety Survey conducted by the U.S. Food and Drug Administration and FSIS/USDA, less than half of American consumers own food thermometers. Of those who do, only 3 percent use them when preparing burgers or other foods at home.

You can find a wide variety of food thermometers at your local supermarket. The cost and understanding of how to use a meat thermometer are worthwhile when it comes to food safety for your family. Don't let Thermy™ down; start using food thermometers today! Just remember "It's Safe to Bite When the Temperature is Right!" For more information on Thermy™ and the food

thermometer campaign, call the toll-free USDA Meat and Poultry Hotline at 800-535-4555, or visit the website at www.fsis.usda.gov/thermy.

Oral Health Connection

Following up on theories of a relationship between obesity and gum disease, researchers at the School of Dental Medicine of the University at Buffalo examined data from the Third National Health and Nutrition Examination Survey (NHANES III) and found that overweight people with the highest levels of insulin resistance were 50 percent more likely than overweight people with low levels of insulin resistance to have advanced periodontal disease.

The research, funded by a grant from the U.S. Public Health Service, analyzed data on the extent of periodontal disease, body mass index (BMI), fasting blood insulin levels, and fasting glucose levels for 10,836 participants who participated in the NHANES III survey. Individuals with diabetes and those with less than six teeth were excluded. Persons with a BMI of more than 27 were considered overweight, and the index of insulin resistance was determined by multiplying the level of fasting insulin by the amount of fasting glucose circulating in the bloodstream.

The analysis found that overweight people with an insulin resistance index in the top quartile were nearly 50 percent more likely to have severe periodontal (gum) disease than those with high BMIs and low levels of

insulin resistance. This relationship is meaningful because obesity is a risk factor for type 2 diabetes and heart disease. It is possible that periodontal disease contributes to serious health consequences in overweight individuals, such as elevated low-density lipoprotein (LDL) and total cholesterol levels.

The results of the study were presented at the April 8, 2000, annual meeting of the International Association for Dental Research. The lead author of the study says that molecular biology-based studies are needed to determine the mechanism and biological basis of the obesity-periodontal disease relationship.

NEW IFIC PUBLICATION

The revised and updated IFIC Review *Uses and Nutritional Impact of Fat Reduction Ingredients* is now available. This referenced white paper contains the latest research on reduced fat foods, their role in a healthful diet, and strategies to manage dietary fat with foods using the different types of ingredients.

This revised publication is available at:

<http://ificinfo.health.org/review/fatr.htm>.



WHAT'S NEW at <http://ificinfo.health.org?>

Link to us! We encourage all of our readers with food, nutrition, and health sites to link to IFIC Foundation OnLine. You may link directly to our homepage or create links to specific documents within our site.

Does Cutting Coffee Really Brew Up A Headache?

From many media reports in recent years, coffee drinkers have come to expect sluggishness and headaches as a result of missing their daily cup. Yet, an article in the *Journal of Pharmacology* (December 1999) challenges these common expectations and suggests that the symptoms from skipping the caffeine in coffee are not as common or as severe as some reports suggest.

The authors, a research team from Harvard Medical School, MDS Harris (a clinical testing facility for drugs and consumer products), and the University of Pennsylvania, began their investigation by adding caffeine-related questions to a demographic and medical survey of 11,112 people who called a testing facility following publicity asking for volunteers for drug and consumer product testing. Of those surveyed, 6,815 people (61%) said they had caffeine from beverages such as coffee, tea, and colas on a daily basis. Only about 1 in 10 of daily

caffeine consumers reported symptoms of caffeine withdrawal if they stop consuming caffeine suddenly. Less than 3 percent said their symptoms were severe enough to interfere with daily activities.

Of those reporting symptoms, 57 individuals were recruited for an intervention trial to gather more detail about the stated symptoms. The 14-day intervention trial used popular brands of caffeinated and decaffeinated instant coffees, but the participants did not know which coffee they were receiving during the trial.

Participants were asked to write down the beverages they consumed each day and to comment on the flavor and aroma of the coffee provided. They were also asked to say whether they liked and would purchase the coffee.

Participants also rated their moods and attitudes during the study. For example, they answered questions such as, "How relaxed were you today?"; "How alert were you today?"; and "Did

you feel healthy and vigorous today?" Even though the participants were told in advance that caffeine content was one feature of the coffees they were evaluating, they were unaware that caffeine withdrawal was under scrutiny because of the variety of other information requested.

During the trial, the 57 individuals were divided into three groups. One group received caffeinated coffee during the entire trial. A second group received caffeinated coffee for 5 days, then decaffeinated coffee for 7 days and finally caffeinated coffee for 2 days. Thus, for the second group, caffeine was suddenly withdrawn. Even so, the authors state, "Only six of the 18 subjects reported symptoms on the first two days of no caffeine." Women reported more changes in mood and attitude than the men did. The researchers suggest that future studies address how men and women may differ in their perception of caffeine withdrawal.

Continued, next page

New IFIC Foundation Publications

Below are the newest releases from the IFIC Foundation. Single copies of most publications are available free-of-charge. For a comprehensive listing of publications or for bulk prices, please request the IFIC Foundation Publications List below.

Publications List (MI-4010)

A complete list of publications and *Food Insight* reprints available from the IFIC Foundation.

It's All About You Nutrition Communicator's Tool Kit (MI-4230)

A new nutrition communicator's Tool Kit to help consumers achieve healthy, active lifestyles. The Tool Kit illustrates positive, simple, and consistent nutrition and health messages and contains an "Owner's Manual for the Body," Leader's Guide, consumer video, and much more. Please send ___ copies at \$19.95 each, plus \$2.50 shipping and handling. Enclosed is a check for \$_____.

Food for Thought III Research (MI-4230)

A quantitative and qualitative analysis of food news as reported by 39 media outlets during three months in 1999, with findings compared with data from two earlier studies. Please send ___ copies of the Full Report at \$20.00 each. Executive Summary: Free.

Food Biotechnology Resource Kit (MI-4080)

This updated and redesigned kit is a compilation of backgrounders on food biotechnology topics, including product benefits, consumer attitudes, federal safeguards and labeling, and the environment. The most recent data on consumer attitudes and government regulatory issues are included. The kit also includes positions of other leading health professional organizations, along with an extensive resource list. Please send ___ copies at \$10.00 each. Enclosed is a check for \$_____.

Starting Solids: A Guide for Parents and Child Care Providers (EB-2020)

This updated brochure not only has an attractive,

colorful new look but also has extensive information on transitioning infant feeding from breast milk and formula to solid foods. In addition, the brochure includes information from the American Red Cross on what to do if your child is choking. Co-published with the National Association of Pediatric Nurse Associates and Practitioners

Take Charge of Your Health: A Teenager's Guide to Better Health (EB-2085)

A brochure that helps empower teenagers to making better choices to improve their health and lifestyles. They learn about how to change their snacking habits, increase physical activity and provides guidance to identify serving sizes. Developed by the National Institutes of Health's Weight-control Information Network.

Caffeine and Health: Clarifying the Controversies (IR-3020)

This updated IFIC Review highlights new research, provides background information on caffeine and seeks to dispel misconceptions that exist about the ingredient.

Children's Nutrition and Physical Activity Teaching Set (MI-4200)

A teaching set designed to help kids ages 9-15 understand the importance of combining nutrition and physical activity. The set features a 22"x34" two-sided color poster highlighting the Physical Activity Pyramid alongside the Food Guide Pyramid. Set includes the Ten Tips to Healthy Eating and Physical Activity for You brochure, reproducible slick and poster. Please send ___ copies at \$3.50 and \$1.50 shipping and handling.

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Cutting Coffee... *Continued from page 7*

In the third group, participants drank caffeinated coffee for 5 days, followed by coffee blends that contained less and less caffeine each day over the next 7 days. By the end of the trial these participants were drinking coffee without caffeine. Although some participants in this group did report symptoms of caffeine withdrawal, there was no consistent pattern to their symptoms.

Other feelings noted by some participants included feelings of being tired or jittery, gastrointestinal problems, and headaches; however, there were no consistent symptom patterns. For example, feeling tired did not necessarily match consumption of a lower level of caffeine. Even participants in the first group reported symptoms, even though they had the same amount of caffeine in their coffee throughout the trial.

The researchers point to three important and unique features of their study in comparison with previous studies of caffeine withdrawal:

- Their study included more participants than other similar studies.

- The participants did not know the topic of the research.
- A segment of the participants was evaluated during a period of gradual caffeine withdrawal.

These features helped to minimize problems with bias in the study design.

Consumers regularly choose to consume caffeine-containing foods and beverages. Many report feeling uncomfortable or complain of headaches, nausea, fatigue, and muscle aches when they suddenly stop consuming these foods or beverages. Yet, these symptoms have not been documented in a scientific way.

The researchers point out that it appears that many more people report a history of withdrawal symptoms than show them when evaluated under blind conditions. According to researcher Dr. Charles O'Brien, "The dramatic thing about this study is the unexpected anecdotes from the subjects such as the person who reported withdrawal symptoms but who, as part of the study, had not had a change in consumption." Dr. Peter Dews adds, "I am impressed by the frequency that symptoms associated with caffeine withdrawal are reported when

there is no reason to suppose there has been a change in caffeine consumption. On average, 18 percent of subjects in all groups on all days reported symptoms. When caffeine was abruptly withdrawn, 27 percent of subjects reported symptoms shortly thereafter. On the same days, 44 percent of the subjects in the group whose caffeine was not changed reported symptoms!"

The researchers further note, "Perhaps a more important observation for evaluating the public health implications of caffeine withdrawal is that even among the people who say they have symptoms, few report these symptoms to be incapacitating."

This study was supported by the North American Branch of the International Life Sciences Institute. Doctors Peter B. Dews, Charles P. O'Brien, Gary L. Curtis and Kathryn J. Hanford were responsible for the conduct of the study.

For more information on caffeine and health, the IFIC Review *Caffeine: Clarifying the Controversies* is available online at <http://www.ificinfo.health.org/review/ir%2Dcaffh.htm>.

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Editor: Ann Bouchoux
Assistant Editor: Susan Pittman, R.D.
Contributors: Sylvia Rowe, Susan T. Borra, R.D., Dave Schmidt, Andy Benson, Geraldine Carbo, Robert Earl, M.P.H., R.D., Amelia Steiner, Lisa Kelly, M.P.H., R.D., Cheryl Toner, M.S., R.D., Allison Esser, Stephanie Ferguson, Anthony O. Food, Katie Thrasher, Winifere Jenkins-Ford, John Klooz, Deborah Leitner, Shameka Lloyd, Tommi Prince, Diane Quagliani, M.B.A., R.D., Laurie Aomar, R.D., L.D., Copy Editor: Michael Hayes
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Email: foodinfo@ific.health.org
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