KITCHEN CREATIONS FACULTY NEWSLETTER #27
June 2010

Salt and High Blood Pressure

In 2005 high blood pressure was responsible for one in six deaths in the United States according to a new report from the Institute of Medicine. High blood pressure increases the risk of dying from a heart attack or stroke more than smoking, high cholesterol, obesity or any other risk factor. Too much salt is a major cause of high blood pressure. Salt may damage the heart, kidneys and other organs, too.

High blood pressure raises the risk of heart failure. High blood pressure is a leading cause of chronic kidney disease. Chronic kidney disease strikes one out nine Americans. There is growing evidence that high blood pressure raises the risk of dementia.

Normal blood pressure is 120 over 80. Hypertension (high blood pressure) is 140 over 90. Blood pressure from 121 over 81 to 139 over 89 is pre-hypertension. Pre-hypertension is associated with increased risk of heart attack and stroke. One out of three Americans has pre-hypertension. Another one out of three has hypertension. Over time 90% of the people in the U.S. develop high blood pressure.

About 28% of people who have hypertension don't know that they have it. Another 11% know they have hypertension, but aren't being treated and 26% are being treated but not enough to get their blood pressure below 140 over 90. That means that 65% of Americans with hypertension don't have their blood pressure under control. Eating less salt would make blood pressure drugs more effective in those who need them.

Dietary Guidelines recommend no more than 1,500 mg of sodium a day for those with high blood pressure, people who are middle aged or over, or are African American. For everyone else 2,300 mg of sodium a day is recommended. Every once else turns out to be 30% of the population.

A study recently published in the *New England Journal of Medicine* found that reducing daily salt consumption by half a teaspoon can have a large benefit. Cutting salt by one half teaspoon could reduce the annual numbers of new cases of coronary heart disease by 60,000 to 120,000. It could reduce stroke by 32,000 to 66,000 and heart attacks by 54,000 to 92,000. Deaths by any cause would be reduced by 44,000 to 92,000. The estimated cost savings to the health care

system would be $10 billion to $24 billion each year. These numbers are projections from a statistical model.

The problem is that 75% to 80% of dietary salt in the U.S. is found in processed foods. A report in the Archives of Internal Medicine studied the sodium intake of people buying fast foods in New York City. Data was collected from noon to 2 pm on week days from March to June 2007. Adults who bought a meal from one of 167 locations representing 11 fast-food chains in the five boroughs of New York City answered a brief survey and provided their purchase receipt in exchange for a $2 metro card. Nutrition information posted on company websites as of March 1, 2007, was used to determine sodium content.

The sample size was just over 6,500 meals. Each meal contained, on average, 1,751 mg of sodium. 20% had more than 2,300 mg. Fried chicken chains were the biggest culprits, with 55% of their meals containing more than 2,300 mg.

Below is a chart of fast-food chains and the mean sodium content of the meals purchased.

	Mean sodium content
Burger	
Burger King	1,685 mg
McDonald's	1,477 mg
Wendy's	1,631 mg
Sandwich	
Au Bon Pain	1,553 mg
Subway	1,883 mg
Fried Chicken	
KFC	2,397 mg
Popeye's	2,497 mg
Pizza	
Domino's	2,465 mg
Papa John's	1,561 mg
Pizza Hut	2,272 mg
Tex-Mex	
Taco Bell	1,849 mg

The researchers stated "our findings support the need for the fast-food industry to focus on reducing sodium levels across product lines. Government, public-health, and industry involvement to accelerate food reformulation will reduce blood pressure and save lives."

Nutrition Action Newsletter April 2010 pgs 3-6
N. Engl. Med. 362:590, 2010
Johnson CM, Angell SY, Lederer A, et al. Sodium content of lunchtime fast food purchases at major US chains. Arch Intern Med 2010; 170:-732-734.

Early Pregnancy Weight Gain is Linked to Gestational Diabetes

Pregnant women who gained weight rapidly (more than .89 lb/week) were 74% more likely to develop gestational diabetes than those gained weight at the slowest rate (less than .60 lb/week. Women who gained weight from .60 to .88 lb/week (the middle third of weight gainers) were 43% more likely to develop gestational diabetes than the lowest weight gainers.

The link between weight gain and diabetes risk was mainly due to weight in the first trimester of pregnancy.

This study was carried out at Kaiser Permanente Medical Group in California. "These findings need to be replicated in other racial/ethnically diverse populations" said Monique Hedderson, PhD of Kaiser Permanente.

Gestational diabetes is defined as glucose intolerance with the onset during the second or third trimester of pregnancy. Gestational diabetes affects 4% to 7% of pregnancies in the U.S.

Gestational diabetes is associated with increased risk of perinatal complications. Women with gestational diabetes and their children are at risk for developing Type 2 diabetes.

The study included 345 women who developed gestational diabetes and 800 women who served as controls. The women were screened for gestational diabetes at 24 to 28 weeks of pregnancy. Plasma glucose levels, weight and other data were obtained by a review of medical records.

The researchers' theory is that rapid weight gain in early pregnancy may cause an early increase in insulin resistance that leads to exhaustion of the beta cells in the pancreas. This could cause the beta cells to be unable to produce enough insulin to control blood glucose levels.

Hedderson M, et al "Gestational weight gain and risk of gestational diabetes mellitus" Obstet Gynecol 2010: 115:597-604.

Insulin Pills

For years drug manufacturers have tried to develop oral insulin. Insulin is a peptide hormone that people with diabetes take by injection to bring their blood sugar within normal limits. Some people are reluctant to give themselves injections. Oral insulin would solve that problem. Stomach acids and enzymes easily destroy insulin and other protein-based drugs. Researchers have had difficulty find a way to eliminate this problem.

Some researchers have developed special coatings for insulin pill that prevent stomach acids from destroying them. They are using additives that make it easier for the intestine to absorb large molecules like insulin. Several insulin pills are now in various stages of clinical trials.

Biocon, a company in India, has a product IN-105. It is an insulin molecule conjugated to a short-chain polyethylene glycol. It retains activity similar to insulin alone, withstands degradation and is consistently absorbed. Results from a Phase III clinical trial in India are expected in September. In 2009, Biocon applied to the U.S. Food and Drug Administration to allow it to start clinical trials.

Solid forms of insulin have efficacy and safety advantages. Insulin delivered this way is believed to behave more like the body's insulin. Natural insulin is secreted by the pancreas and taken up by the liver. The liver stores insulin and distributes it out as needed. Engineered for release in part of the small intestine, just past the stomach, solid oral insulin can be taken up from there by the portal vein and delivered to the liver.

Getting the insulin through the stomach with an enteric coated tablet that is stable under acidic conditions is the first step. The second step is getting a large, hydrophilic protein past the intestinal walls. Proteins find it hard to diffuse across the hydrophilic lipid membrane or through epithelia cells in the wall. It is thought that the proteins can squeeze between the cells. Developers add permeability or absorption enhancers to the formulation.

As products move into clinical trials, there are questions about the long-term effects of insulin and accompanying materials. Insulin induces cell division and there is a worry that it might be associated with an increased risk of certain cancers. Companies developing oral insulin believe that nothing but the drug and enhancers pass through the intestine.

Chemical & Engineering News June 2010

Tracking Blood Sugar with Nano-Tattoos

Researchers at MIT are working on a new type blood glucose monitor that could eliminate the need for finger pricks and also offer more accurate readings.

The glucose sensing system consists of a "tattoo" of nanoparticles designed to detect glucose, injected below the skin. A device similar to a wristwatch would be worn over the tattoo. It would display the patient's glucose levels.

A 2008 study in the *New England Journal of Medicine* showed that continuous monitoring helped adult Type 1 diabetes patients who were 25 years old or above control their blood glucose levels better. Most existing continuous glucose sensors work by an injection of an enzyme called glucose oxidase, which breaks down glucose. An electrode placed on the skin interacts with a by-product of that reaction, hydrogen peroxide, allowing glucose levels to be measured indirectly. None of these sensors have been approved for use longer than seven days at a time.

The technology being used in the MIT sensor is different. The sensor is based on carbon nanotubes wrapped in a polymer that is sensitive to glucose concentrations. When the sensor encounters glucose, the nanotubes fluoresce, which is detected by shining near-infrared light on them. Measuring the amount of fluorescence reveals the concentration of glucose

The researchers plan to create an "ink" of these nanoparticles suspended in a saline solution that could be injected under the skin like a tattoo. The "tattoo" would last for a specified length of time, probably six months, before it would need to be refreshed.

To get glucose readings, the patient would war a monitor that shines near-infrared light on the tattoo and detects the fluorescence. The sensor can give continuous readings. The researchers are working to improve the accuracy of the sensor. They are still years away from human trials, but they may soon start trials in animals.

www.diabetesincontrol.com June 6, 2010 Issue #524

Websites with information in Spanish

Recipes in Spanish from the American Diabetes Association
http://www.diabetes.org/espanol/nutricin-y-recetas/recetas/

This web page contains 34 hand outs with information on diabetes in Spanish. Included is Tasty Recipes for People with Diabetes and their families. Sometimes this PDF take a long time to down load. There is also a Prevent Diabetes Problems series; it has 7 hand outs in Spanish
http://diabetes.niddk.nih.gov/spanish/index.asp

On this web page you choose a topic, the target audience, ethnicity and language and then search.
http://www.thecmafoundation.org/PEM/application/Default.aspx

On the right side of this web page many languages are listed. Click on Spanish and then choose which materials you want.
http://monarch.gsu.edu/WebRoot$/multiculturalhealth/

Diabetes information from CDC
http://www.cdc.gov/diabetes/spanish/diabetes_y_yo.htm

National Diabetes Information Clearinghouse, on the left side click on Spanish language Publications
http://diabetes.niddk.nih.gov/

Websites with information in English

The DLife home page has information on Type 1 Diabetes, Type 2 Diabetes, Diabetes Supplies, Diabetes Recipes, Diabetes News, Diabetes Research
http://www.dlife.com

Recipes from DLife
http://www.dlife.com/diabetes/diabetic-recipes/

National Diabetes Information Clearinghouse, on the left side click on A to Z list of Diabetes Topics and Titles
http://diabetes.niddk.nih.gov/

Diabetes Information from CDC
http://www.cdc.gov/diabetes/

Publications in both English and Spanish from Extension
Go to http://aces.nmsu.edu/pubs/_e/
Scroll down to the Control your Diabetes for Life publication series

Circular 569-A Control your Diabetes for Life: What is Diabetes?
Circular 569-B Control your Diabetes for Life: Who Gets Diabetes?
Circular 569-C Control your Diabetes for Life: Healthy Living with Diabetes
Circular 569-D Control your Diabetes for Life: Navigating the Health Care System
Circular 569-E Control your Diabetes for Life: Know Your Numbers
Circular 569-F Control your Diabetes for Life: Diabetes Medication
Circular 569-G Control your Diabetes for Life: Coping with Diabetes
Circular 569-H Control your Diabetes for Life: Exercise for People with Diabetes
Circular 569- I Control your Diabetes for Life: Preventing Complications
Circular 569- J Control your Diabetes for Life: Healthy Feet
Circular 631-A: Control your Diabetes for Life: Nutrition Series - Choosing Foods at Meals and Snacks
Circular 631-B: Control your Diabetes for Life: Nutrition Series - How to Read a Nutrition Facts Label
Circular 631-C: Control your Diabetes for Life: Nutrition Series - What About Sweets?
Circular 631-D: Control your Diabetes for Life: Keeping Heart Healthy
Circular 631-E: Control your Diabetes for Life: Nutrition Series - Diabetes Food Guide Pyramid

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