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<http://clinicaltrials.gov/ct2/show/NCT00332124>

**ESSENCE OF ARTICLE**

“2: Active Comparator

Participants will take choline

## **Dietary Supplement: Choline**

900 mg every day until birth of infant.”

### ARTICLE

#### Purpose

This study will evaluate the safety and effectiveness of taking choline supplements during pregnancy, and whether choline supplementation has an effect on infant development.

#### Condition

#### Intervention

#### Phase

#### Pregnancy

Child Development     Dietary Supplement: Choline

Dietary Supplement: Placebo     Phase I

Study Type:     Interventional

Study Design:     Treatment, Randomized, Double Blind (Subject, Caregiver, Investigator), Placebo Control, Parallel Assignment, Safety/Efficacy Study

Official Title:     Double-Blind Trial of Phosphatidylcholine During Pregnancy and Infant Serum Choline Levels

Resource links provided by NLM:

MedlinePlus related topics: Dietary Supplements Diets

Drug Information available for: Choline Choline chloride Choline dihydrogen citrate Choline bitartrate Choline salicylate

U.S. FDA Resources

Further study details as provided by National Institute of Mental Health (NIMH):

Primary Outcome Measures:

- Mullens Developmental Assessment Test [ Time Frame: Measured at Months 6, 12, and 18 after birth ] [ Designated as safety issue: No ]

Estimated Enrollment:     258

Study Start Date:     June 2006

Estimated Study Completion Date: March 2010

Estimated Primary Completion Date: March 2008 (Final data collection date for primary outcome measure)

Arms

Assigned Interventions

1: Placebo Comparator

Participants will take placebo Dietary Supplement: Placebo

Corn oil every day in place of choline

2: Active Comparator

Participants will take choline Dietary Supplement: Choline

900 mg every day until birth of infant

Detailed Description:

Choline is an essential nutrient that can be found in foods, such as egg yolks, liver, and other meats. It is important for the composition and repair of normal cellular membranes, normal brain function, and normal cardiovascular function. Research has suggested that the presence of adequate amounts of choline during pregnancy and breastfeeding can help ensure healthy fetal brain development. Additionally, adequate prenatal choline levels may have long-lasting positive effects on cognitive function, including memory. However, sufficient research has not been done on the effects of choline on pregnant women and their unborn babies. This study will evaluate the safety and effectiveness of taking choline supplements during pregnancy, and whether taking choline during pregnancy will have an effect on infant development.

Participants in this double-blind study will be randomly assigned to receive either placebo or 900 mg of choline daily throughout pregnancy, until delivery. Babies will then begin receiving either placebo or choline daily from the time of birth until they are 3 months old. Participants will attend a baseline study visit that will include eligibility assessment, urine collection, measurement of vital signs, dispensing of study medication, and an ultrasound. Subsequent study visits will occur every 4 weeks throughout pregnancy and 6 months postpartum. Vital signs will be taken, urine samples will be collected, and study medication will be given at each visit. Two blood samples will be taken between Weeks 32 and 36 of gestation. Heel sticks will be performed on babies when they are 4 and 12 weeks old. Follow-up visits will be held every 6 months until the baby is 18 months old.

Eligibility

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<http://www.pregnancytoday.com/articles/nutrition/choline-during-pregnancy-4349/2/>

Pregnancy Nutrition & Recipes

## **Choline During Pregnancy; An Essential Pregnancy Nutrient**

### ESSENCE OF ARTICLE

“The recommended daily choline intake for pregnant women is 450 milligrams per day compared to 425 milligrams for non-pregnant women. During lactation, the daily choline requirement increases to 550 milligrams per day because human milk contains a substantial amount of choline.

Choline can be found in eggs, chicken liver, beef liver, pork loin, roasted chicken, ground beef, shrimp, soybeans and wheat germ. Choline can also be found in potatoes, lentils, cauliflower, oats, sesame seeds and flax seeds and, in lower amounts, in some leafy green vegetables.”

### ARTICLE

By Teri Brown

Basically, choline is an essential amino acid that humans need for a number of important functions in the body. It comes largely from dietary sources, but is also made in small quantities by the body in the liver.

#### The Importance of Choline in Pregnancy

Choline is important for the structural integrity of our cell membranes, the breakdown and utilization of fat for energy and cholesterol transport and elimination from the body, Dr. Paul says. Choline is significant for communicating information from nerve to nerve and also plays an important role in male and female fertility. Also crucial is how it affects the unborn child's brain.

"Animal studies show that choline is essential for development of the memory center in the brain," Dr. Paul says. "Choline helps increase the number of cells in the memory center during a critical period of brain development. Animals whose mothers were fed supplemental choline scored better on memory tasks throughout their entire lifetime compared to animals born to mothers who were choline deficient. Choline deficiency also increases the risk for neural tube defects, especially in women who do not consume enough folate."

Dr. Randy Fink, a Miami, Fla., OB/GYN and Fellow with the American Board of Obstetrics and Gynecology, says that during pregnancy, choline stores can be depleted.

"Prenatal vitamins contain lecithin, which is a partially absorbable form of choline, but it may not represent an adequate enough daily amount," Dr. Fink says. "Recently, more attention has been paid to choline in pregnancy, and some see it as a miracle brain drug for unborn babies; some say it "supercharges the brain" of the unborn fetus. This arises from data in laboratory animals. Pregnant rats that were given extra doses of choline had offspring that learned more efficiently and had better memory function. Those that were deprived on choline had poorer memory capacity. The changes – both for better and for worse – seemed to be lifelong."

How Much Choline?

The recommended daily choline intake for pregnant women is 450 milligrams per day compared to 425 milligrams for non-pregnant women. During lactation, the daily choline requirement increases to 550 milligrams per day because human milk contains a substantial amount of choline.

Choline can be found in eggs, chicken liver, beef liver, pork loin, roasted chicken, ground beef, shrimp, soybeans and wheat germ. Choline can also be found in potatoes, lentils, cauliflower, oats, sesame seeds and flax seeds and, in lower amounts, in some leafy green vegetables.

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<http://www.whfoods.com/genpage.php?tname=foodspice&dbid=92>

## ESSENCE OF ARTICLE

**“ The National Academy of Sciences recommends higher daily intake of choline for pregnant and breastfeeding women (550 mg and 450 mg, respectively). “**

## ARTICLE

Eggs are available year round to provide not only delicious meals on their own but as an essential ingredient for the many baked goods and sauces that would never be the same without them.

Composed of a yellow yolk and translucent white surrounded by a protective shell, the incredible nature of the egg is partially found in their unique food chemistry which allows them help in coagulation, foaming, emulsification and browning.

- Health Benefits
- Description
- History
- How to Select and Store
- How to Enjoy
- Safety
- Nutritional Profile
- References

## Health Benefits

Eggs are a good source of low-cost high-quality protein, providing 5.5 grams of protein (11.1% of the daily value for protein) in one egg for a caloric cost of only 68 calories. The structure of humans and animals is built on protein. We rely on animal and vegetable protein for our supply of amino acids, and then our bodies rearrange the nitrogen to create the pattern of amino acids we require.

## Boost Brain Health with Eggs' Choline

Another health benefit of eggs is their contribution to the diet as a source of choline. Although our bodies can produce some choline, we cannot make enough to make up for an inadequate supply in our diets, and choline deficiency can also cause deficiency of another B vitamin critically important for health, folic acid.

Choline is definitely a nutrient needed in good supply for good health. Choline is a key component of many fat-containing structures in cell membranes, whose flexibility and integrity depend on adequate supplies of choline. Two fat-like molecules in the brain, phosphatidylcholine and sphingomyelin, account for an unusually high percentage of the brain's total mass, so choline is particularly important for brain function and health.

In addition, choline is a highly important molecule in a cellular process called methylation. Many important chemical events in the body are made possible by methylation, in which methyl groups are transferred from one place to another. For example, genes in the body can be switched on or turned off in this way, and cells use methylation to send messages back and forth. Choline, which contains three methyl groups, is highly active in this process.

Choline is also a key component of acetylcholine. A neurotransmitter that carries messages from and to nerves, acetylcholine is the body's primary chemical means of sending messages between nerves and muscles.

## Eggs' Choline Reduces Inflammation

People whose diets supplied the highest average intake of choline (found in egg yolk and soybeans), and its metabolite betaine (found naturally in vegetables such as beets and spinach), have levels of inflammatory markers at least 20% lower than subjects with the lowest average intakes, report Greek researchers in the American Journal of Clinical Nutrition (Detopoulou P, Panagiotakos DB, et al.)

Compared to those whose diets contained <250 mg/day of choline, subjects whose diets supplied >310 mg of choline daily had, on average:

- 22% lower concentrations of C-reactive protein
- 26% lower concentrations of interleukin-6
- 6% lower concentrations of tumor necrosis factor alpha

Compared to those consuming <260 mg/day of betaine, subjects whose diets provided >360 mg per day of betaine had, on average:

- 10% lower concentrations of homocysteine
- 19% lower concentrations of C-reactive protein
- 12% lower concentrations of tumor necrosis factor alpha

Each of these markers of chronic inflammation has been linked to a wide range of conditions including heart disease, osteoporosis, cognitive decline and Alzheimer's, and type-2 diabetes.

In an accompanying editorial in the American Journal of Clinical Nutrition entitled, "Is there a new component of the Mediterranean diet that reduces inflammation?," Steven Zeisel from the University of North Carolina at Chapel Hill noted that choline and betaine work together in the cellular process of methylation, which is not only responsible for the removal of homocysteine, but is involved in turning off the promoter regions of genes involved in inflammation.

"Exposure to oxidative stress is a potent trigger for inflammation. Betaine is formed from choline within the mitochondria, and this oxidation contributes to mitochondrial redox status," Zeisel continued.

"If the association between choline and betaine and inflammation can be confirmed in studies of other populations, an interesting new dietary approach may be available for reducing chronic diseases associated with inflammation," he concluded.

Recommended daily intakes of choline were set in 1998 at 550 milligrams per day for men and 425 milligrams a day for women. No RDI has been set for betaine, which, since it is a metabolite of choline, is not considered an essential nutrient.

Practical Tip: Egg yolks are the richest source of choline, followed by soybeans. Spinach, beets and whole wheat products are primary sources of betaine. (Olthof MR, van Vliet T, et al. J Nutr)

#### Eggs -- An Easy Answer for Americans' Unmet Need for Choline

More than 90% of Americans are choline-deficient. An assessment American's dietary choline intake by Iowa State University researchers (Jensen H, Batres-Marquez S, et al., FASEB Journal) revealed that for older children, men, women and pregnant women, intake is dramatically below Adequate Intake (AI) levels, with only 10% or less of all these groups getting even close to recommended amounts of choline.

This finding is especially concerning in pregnant women because choline is necessary for brain and memory development in the fetus. (Shaw GM, Carmichael SL, Am J Epidemiol; Zeisel SH, Annu Rev Nutr) The National Academy of Sciences recommends higher daily intake of choline for pregnant and breastfeeding women (550 mg and 450 mg, respectively).

Older adults are also at high risk of choline deficiency. Research presented by Debra Keast, PhD, at the 31st National Nutrient Data Bank Conference, Washington, DC, revealed that choline intake decreases with age, with adults ages 71 and older typically consuming an average of about 264 milligrams per day, roughly half the AI for choline (550 mg/day for men, 425 mg/day for women).

And even getting the recommended AI for choline may not meet the needs of approximately 20% of men. Research published in the American Journal of Clinical Nutrition (Fischer LM, deCosta KA, et al.) found that when 26 men were given a diet providing 550 mg/day of choline, 6 of the men developed fatty liver or muscle damage (signs of choline insufficiency).

In addition to the 26 men, 16 premenopausal and 15 postmenopausal women took part in this study. All participants were fed a diet supplying 550 mg/day of choline for 10 days followed by a diet containing less than 50 mg/day of choline for up to another 42 days.

When deprived of dietary choline, 77% of the men, 80% of the postmenopausal women, and 44% of the premenopausal women developed fatty liver or muscle damage. (Premenopausal women, while harmed, were not as sorely affected because choline can be made by our bodies from the de novo synthesis of phosphatidylcholine, which is up-regulated by estrogen.)

**Practical Tip:** Foods that are good sources of choline should be frequent contributors to your healthy way of eating. Two large eggs provide 252 milligrams of choline (all in yolk), a little less than half the recommended daily supply, and also contain 630 milligrams (yes, milligrams not micrograms) of phosphatidylcholine. Although most sources just report the free choline at 252 micrograms, it is the phosphatidylcholine that is the most common form in which choline is incorporated into cell membrane phospholipids.

Other rich sources of choline (per 100 grams / 3 ounces of food) include beef liver (355 mg), dried soy beans (116 mg), wheat germ (152 mg), cod (83 mg), chicken (70 mg), and salmon (65 mg).

### An Egg Breakfast Helps Promote Weight Loss

In a randomized controlled trial, 160 overweight or obese men and women were divided into 2 groups, one of which ate a breakfast including 2 eggs, while the other consumed a bagel breakfast supplying the same amount of calories and weight mass (an important control factor in satiety and weight loss studies). Participants ate their assigned breakfast at least 5 days a week for 8 weeks as part of a low-fat diet with a 1,000 calorie deficit. (Dhurandhar N, Vander Wal J, et al, FASEB Journal)

Compared to those on the bagel breakfast, egg eaters:

- Lost almost twice as much weight -- egg eaters lost an average of 6.0 pounds compared to bagel eaters' 3.5 pound loss.
- Had an 83% greater decrease in waist circumference
- Reported greater improvements in energy

No significant differences were seen between blood levels of total, HDL and LDL cholesterol, and triglycerides in either group, confirming what other studies (Ballesteros MN, Cabrera RM, Am J Clin Nutr) have shown, including a relative risk study presented at the Experimental Biology meeting: healthy people can safely enjoy eggs without increasing their heart attack risk. The relative risk study, a thorough scientific review of the major studies concerning heart disease causation, which was conducted by Washington, DC-based scientific consulting firm, Exponent, found that eggs contribute just 0.6 percent of men's and 0.4 percent of women's coronary heart disease risk.

### Eggs and Heart Health

In addition to its significant effects on brain function and the nervous system, choline also has an impact on cardiovascular health since it is one of the B vitamins that helps convert homocysteine, a molecule that can damage blood vessels, into other benign substances. Eggs are also a good source of vitamin B12, another B vitamin that is of major importance in the process of converting homocysteine into safe molecules.

Eggs are high in cholesterol, and health experts in the past counseled people to therefore avoid this food. (All of the cholesterol in the egg is in the yolk.) However, nutrition experts have now determined people on a low-fat diet can eat one or two eggs a day without measurable changes in their blood cholesterol levels. This information is supported by a statistical analysis of 224 dietary studies carried out over the past 25 years that investigated the relationship between diet and blood cholesterol levels in over 8,000 subjects. What investigators in this study found was that saturated fat in the diet, not dietary cholesterol, is what influences blood cholesterol levels the most.

### Improve Your Cholesterol Profile

Not only have studies shown that eggs do not significantly affect cholesterol levels in most individuals, but the latest research suggests that eating whole eggs may actually result in significant improvement in one's blood lipids (cholesterol) profile-even in persons whose cholesterol levels rise when eating cholesterol-rich foods.

In northern Mexico, an area in which the diet contains a high amount of fat because of its reliance on low-cost meat products and tortillas made with hydrogenated oils, coronary artery disease is common. In a study published in the American Journal of Clinical Nutrition, researchers evaluated the effects of daily consumption of whole eggs on the ratio of LDL (bad) cholesterol to HDL (good) cholesterol, and phenotype (the way an individual's genetic possibilities are actually expressed) in 54 children (8-12 years old) from this region. A month of eating 2 eggs daily, not only did not worsen the children's ratio of LDL:HDL, which remained the same, but the size of their LDL cholesterol increased-a very beneficial change since larger LDL is much less atherogenic (likely to promote atherosclerosis) than the smaller LDL subfractions. Among children who originally had the high-risk LDL phenotype B, 15% shifted to the low-risk LDL phenotype A after just one month of eating whole eggs.

### Helping to Prevent Blood Clots

Eating eggs may help lower risk of a heart attack or stroke by helping to prevent blood clots. A study published in Biological and Pharmaceutical Bulletin demonstrated that proteins in egg yolk are not only potent inhibitors of human platelet aggregation, but also prolong the time it takes for fibrinogen, a protein present in blood, to be converted into fibrin. Fibrin serves as the scaffolding upon which clumps of platelets along with red and white blood cells are deposited to form a blood clot. These anti-clotting egg yolk proteins inhibit clot formation in a dose-dependent manner-the more egg yolks eaten, the more clot preventing action.(That being said, it's still important to only eat the amount of eggs that fits within your own personal Healthiest Way of Eating.)

### Protection against Age-Related Macular Degeneration and Cataracts

Lutein, a carotenoid thought to help prevent age-related macular degeneration and cataracts, may be found in even higher amounts in eggs than in green vegetables such as spinach, which have been considered its major dietary sources, as well as in supplements. Research presented at the annual American Dietetic Association Conference in San Antonio, Texas, in 2003, by Elizabeth Johnson from the Jean Mayer USDA Human Nutrition Research Center on Aging at Tufts University also showed that natural lutein esters found in eggs are as or even more bioavailable as the forms of the nutrient offered in purified lutein products. Johnson's trial tested serum lutein concentration in 10 healthy men, before and

after daily consumption of 6mg lutein obtained from four different sources: eggs from chickens fed marigold petals (which are high in lutein), spinach (one of the best known sources of dietary lutein), lutein ester supplements (purified lutein) and lutein supplements. Differences in serum lutein levels in response to the various types of doses were observed the day after the first dose: the serum lutein response to egg was significantly greater than the supplements but no higher than the response to the spinach. After nine days of daily lutein dosing, the serum lutein response was significantly greater in the egg phase than either of the supplements or the spinach. The bottom line: this study suggests that eating lutein-rich foods may be a more effective means of boosting lutein concentration in the eye than taking supplements.

Another human study, published in the *Journal of Nutrition*, confirms that lutein is best absorbed from egg yolk-not lutein supplements or even spinach. Egg yolks, although they contain significantly less lutein than spinach, are a much more bioavailable source whose consumption increases lutein concentrations in the blood many-fold higher than spinach.

Although the mechanism by which egg yolk increases lutein bioavailability is not yet known, it is likely due to the fats (cholesterol and choline) found in egg yolk. Lutein, like other carotenoids, is fat-soluble, so cannot be absorbed unless fat is also present. (If this is the case, then to enhance the lutein absorption from spinach and other vegetables rich in this nutrient, we suggest enjoying them with some fat such as extra virgin olive oil). To maximally boost your lutein absorption, you could also combine both eggs and spinach. Whether you prefer your spinach steamed, sautéed or fresh in spinach salad, dress it with a little olive oil and a topping of chopped hard-boiled egg. For a flavorful, quick and easy recipe featuring eggs and spinach, try our Poached Eggs over Spinach and Mushrooms.

#### Eggs Protect Eyesight without Increasing Cholesterol

Two new studies published in the *Journal of Nutrition* add further evidence to the theory that a daily egg-whose yolk is a rich source of vision-protective carotenoids, including not only lutein but also zeaxanthin-may reduce the risk of developing age-related macular degeneration (AMD).

The studies, both conducted at the University of Massachusetts, show that, in addition to keeping hunger at bay longer (eggs' satiety index is 50% that of most breakfast cereals), an egg a day boosts blood levels of both lutein and zeaxanthin, thus reducing the risk of AMD-without increasing cholesterol or triglyceride levels.

In AMD, the macula, the central part of the retina which controls fine vision, deteriorates, greatly limiting eyesight or even resulting in blindness in those afflicted. The leading cause of blindness in people over age 50, AMD afflicts more than 10 million people in the United States, plus an additional 15 to 20 million worldwide.

In the first study, a randomized cross-over trial, Elizabeth Goodrow and her team investigated the effects of eating one egg a day on blood levels of lutein, zeaxanthin, cholesterol and triglycerides in 33 men and women over age 60.

After a no-egg start up week, volunteers ate either an egg or egg substitute daily for 5 weeks, then again ate no eggs for a week before crossing over to the other intervention for a second 5 weeks.

After the 5-week period in which they ate a daily egg, participants' blood levels of lutein and zeaxanthin significantly increased by 26 and 38%, respectively, compared to their levels of these carotenoids after their no-egg week.

And although eggs are well-known for containing cholesterol, participants' blood levels of total cholesterol, LDL cholesterol, HDL cholesterol, and triglycerides were not affected by eating an egg a day.

In the second study, researchers led by Adam Wenzel looked at the effect of a 12-week egg intervention on lutein and zeaxanthin levels in both the blood and the retina of the eye (the macular pigment optical density or MPOD) of 24 women ranging in age from 24 to 59.

The women were randomly assigned to eat 6 eggs every week containing either 331 micrograms (Egg1) or 964 micrograms (Egg2) of lutein and zeaxanthin per yolk, or a placebo (a sugar-filled pill).

No changes in cholesterol levels were seen in the women eating eggs, but in those given the placebo (the sugar pill), increases in total cholesterol and triglycerides were recorded.

Unlike the first study, only blood levels of zeaxanthin, but not lutein, increased in both Egg1 and Egg2 groups; however, carotenoid levels in the retina (MPOD) increased in both egg intervention groups, a result that suggests a daily egg offers protection against AMD.

Although egg yolk contains less lutein and zeaxanthin than some other foods—spinach, for example—when supplied by eggs, these carotenoids appear to be especially well absorbed into the retina. "Increasing egg consumption to 6 eggs per week may be an effective method to increase MPOD," wrote lead study author Wenzel.

So, enjoy a quick and easy, vision-sustaining poached or soft boiled egg for breakfast. Take an egg salad sandwich to work or add a hard boiled egg to your luncheon salad. On the weekend, treat yourself to our Healthy Breakfast Frittata or Egg Crepes filled with veggies, one of the delicious egg recipes featured in *The World's Healthiest Foods Essential Guide*. We suggest choosing organic omega-3-rich eggs if available. Produced by hens fed a diet rich in flaxseed, these eggs are an exceptional source not only of lutein and zeaxanthin, but anti-inflammatory omega-3 essential fatty acids as well.

## Description

Eggs are exceptional foods. They are whole foods, prepackaged sources of carbohydrates, protein, fat and micronutrients. Yet, their exquisite nutritional value should not be surprising when you remember that an egg contains everything needed for the nourishment of a developing chick.

Eggs are composed of a yellow yolk and translucent white surrounded by a protective shell that can be white or brown, depending upon the breed of the chicken. The shell's color is not related to the quality or nutritional value of the egg itself.

In addition to their wonderful taste and nutritional content, eggs hold an esteemed place in cooking since due to their food chemistry, they serve many unique functions in recipes, including coagulation, foaming, emulsification and browning.

While chickens are not the only animals that lay eggs that are enjoyed in various cuisines, it is the type featured in this article because it is the most highly accessible in North America.

In Latin, the scientific name for chicken is *Gallus domesticus*.

## History

The history of the egg as food runs mostly parallel with the history of people consuming chicken as food. Although it is uncertain when and where it began, the practice of raising chickens for food is ancient and so, subsequently, is the consumption of eggs as food, extending back to the times of early man.

Eggs have always been a symbol of fertility and have been an icon of religious worship. To this day, there is still a lot of folklore surrounding eggs that is enjoyed by different cultures around the world.

One of the most widely held food and holiday associations is that of the Easter egg. How the egg became associated with this holiday seems to have roots that are both biological and cultural. Before more modern techniques of poultry raising, hens laid few eggs during the winter. This meant that Easter, occurring with the advent of spring, coincided with the hen's renewed cycle of laying numerous eggs. Additionally, since eggs were traditionally considered a food of luxury, they were forbidden during Lent, so Christians had to wait until Easter to eat them-another reason eggs became associated with this holiday. Interestingly enough, the custom of painting eggshells has an extensive history and was a popular custom among many ancient civilizations, including the Egyptians, Chinese, Greeks and Persians.

## How to Select and Store

Oftentimes, in the U.S., eggs are classified according to the USDA grading system and bear a label of AA, A, or B. This grading is an indicator of quality parameters, including freshness, with AA being of the most superior in quality. Eggs are also labeled according to their size-extra large, large, medium and small-which is graded according to a standard.

Yet, you may not see any labeling on the eggs you buy since it is not legally mandatory that they be inspected and graded by these federal standards. This is often the situation when you buy farm fresh eggs from a local purveyor. If this is the case, get to know the seller and his or her reputation and make sure that, as usual, the eggs are kept refrigerated.

Inspect any eggs that you purchase for breaks or cracks. And of course, take care when packing them in your shopping bag for the trip home as they are very fragile.

Store eggs in the refrigerator where they will stay fresh for about one month. Do not wash them as this can remove their protective coating. Keep them in their original carton or in a covered container so that they do not absorb odors or lose any moisture. Do not store them in the refrigerator door since this exposes them to too much heat each time the refrigerator is opened and closed. Make sure to store them with their pointed end facing downward as this will help to prevent the air chamber, and the yolk, from being displaced.

## How to Enjoy

For some of our favorite recipes, click [Recipes](#).

### Tips for Preparing Eggs:

In order to prevent any possible contamination to a recipe by a spoiled egg, break each egg separately into a small bowl before combining with the other ingredients.

### A Few Quick Serving Ideas:

Hard-boiled eggs are fun to eat and easy to pack for on-the-go lunches.

Mix chopped up hard-boiled eggs with fresh lemon juice and olive oil, leeks and dill (and salt and pepper to taste) to make a healthy egg salad.

Instead of Eggs Benedict, make Eggs "Buenodict." Place a poached egg on top of a whole grain English muffin lined with steamed spinach. Top with salsa or any of your favorite seasonings and enjoy.

Say olé to the day with a huevos ranchero breakfast. Add chili peppers to scrambled eggs and serve with black beans and corn tortillas.

### Safety

#### Allergic Reactions to Eggs

Although allergic reactions can occur to virtually any food, research studies on food allergy consistently report more problems with some foods than with others. For example, according to a recent report by the U.S. Centers for Disease Control, 90% of food allergies are associated with 8 food types: hen's eggs, fish, crustacean shellfish, cow's milk, soy foods, peanuts, wheat, and tree nuts. (Crustacean shellfish include shrimp, prawns, lobster, and crab. Tree nuts include almonds, cashews, walnuts, pecans, pistachios, Brazil nuts, hazelnuts, and chestnuts.)

These foods do not need to be eaten in their pure, isolated form in order to trigger an adverse reaction. For example, yogurt made from cow's milk is also a common allergenic food, even though the cow's milk has been processed and fermented in order to make the yogurt. Ice cream made from cow's milk would be an equally good example.

Food allergy symptoms may sometimes be immediate and specific, and can include skin rash, hives, itching, and eczema; swelling of the lips, tongue, or throat; tingling in the mouth; wheezing or nasal congestion; trouble breathing; and dizziness or lightheadedness. But food allergy symptoms may also be much more general and delayed, and can include fatigue, depression, chronic headache, chronic bowel problems (such as diarrhea or constipation), and insomnia. Because most food allergy symptoms can be caused by a variety of other health problems, it is good practice to seek the help of a healthcare provider when evaluating the role of food allergies in your health.

#### Handling of Eggs

Health safety concerns about eggs center on salmonellosis (salmonella-caused food poisoning). Salmonella bacteria from the chicken's intestines may be found even in clean, uncracked eggs. Formerly, these bacteria were found only in eggs with cracked shells. Safe food techniques, like washing the eggs before cracking them, may not protect you from infection. To destroy the bacteria, eggs must be cooked at

high enough temperatures for a sufficient length of time to destroy the bacteria. Soft-cooked, sunny-side up or raw eggs carry salmonellosis risk. Hard-boiled, scrambled, or poached eggs do not.

Another reason to avoid consuming raw eggs is that raw egg whites contain a glycoprotein called avidin, which binds to eggs' supply of the B vitamin biotin very tightly, preventing its absorption. Cooking the egg whites changes avidin, making it susceptible to digestion and unable to interfere with the intestinal absorption of biotin.

Dishes and utensils used when preparing eggs should be washed in warm water separately from other kitchenware, and hand-washing with warm, soapy water is essential after handling eggs. Any surfaces that might have potentially come into contact with raw egg should be washed and can be sanitized with a solution of 1 teaspoon chlorine to 1 quart water.

### Nutritional Profile

#### Introduction to Food Rating System Chart

The following chart shows the nutrients for which this food is either an excellent, very good or good source. Next to the nutrient name you will find the following information: the amount of the nutrient that is included in the noted serving of this food; the %Daily Value (DV) that that amount represents (similar to other information presented in the website, this DV is calculated for 25-50 year old healthy woman); the nutrient density rating; and, the food's World's Healthiest Foods Rating. Underneath the chart is a table that summarizes how the ratings were devised. Read detailed information on our Food and Recipe Rating System.

Egg, whole, boiled

1.00 each

44.00 grams

68.20 calories

Nutrient	Amount	DV
----------	--------	----

(%)	Nutrient
-----	----------

Density	World's Healthiest
---------	--------------------

Foods Rating
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tryptophan	0.07 g	21.9	5.8	very good
selenium	13.55 mcg	19.4	5.1	very good
iodine	23.76 mcg	15.8	4.2	very good
vitamin B2 (riboflavin)	0.23 mg	13.5	3.6	very good
protein	5.54 g	11.1	2.9	good

molybdenum	7.48 mcg	10.0	2.6	good
vitamin B12 (cobalamin)	0.49 mcg	8.2	2.2	good
phosphorus	75.68 mg	7.6	2.0	good
vitamin B5 (pantothenic acid)	0.62 mg	6.2	1.6	good
vitamin D	22.88 IU	5.7	1.5	good

#### World's Healthiest

#### Foods Rating Rule

excellent	DV>=75%	OR	Density>=7.6	AND	DV>=10%
very good	DV>=50%	OR	Density>=3.4	AND	DV>=5%
good	DV>=25%	OR	Density>=1.5	AND	DV>=2.5%

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## **Human Brain Mapping**

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Research Article

Brain structure and obesity

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## KEYWORDS

brain atrophy • obesity • tensor-based morphometry

## ESSENCE OF ARTICLE

” These cardiovascular afflictions increase risk for cognitive decline and dementia, but it is unknown whether these factors, specifically obesity and Type II diabetes, are associated with specific patterns of brain atrophy.....

Obesity is therefore associated with detectable brain volume deficits in cognitively normal elderly subjects”

## ARTICLE

### ABSTRACT

Obesity is associated with increased risk for cardiovascular health problems including diabetes, hypertension, and stroke. These cardiovascular afflictions increase risk for cognitive decline and dementia, but it is unknown whether these factors, specifically obesity and Type II diabetes, are associated with specific patterns of brain atrophy. We used tensor-based morphometry (TBM) to examine gray matter (GM) and white matter (WM) volume differences in 94 elderly subjects who remained cognitively normal for at least 5 years after their scan. Bivariate analyses with corrections for multiple comparisons strongly linked body mass index (BMI), fasting plasma insulin (FPI) levels, and Type II Diabetes Mellitus (DM2) with atrophy in frontal, temporal, and subcortical brain regions. A multiple regression model, also correcting for multiple comparisons, revealed that BMI was still negatively correlated with brain atrophy (FDR <5%), while DM2 and FPI were no longer associated with any volume differences. In an Analysis of Covariance (ANCOVA) model controlling for age, gender, and race, obese subjects with a high BMI (BMI > 30) showed atrophy in the frontal lobes, anterior cingulate gyrus, hippocampus, and thalamus compared with individuals with a normal BMI (18.5-25). Overweight subjects (BMI: 25-30) had atrophy in the basal ganglia and corona radiata of the WM. Overall brain volume did not differ between overweight and obese persons. Higher BMI was associated with lower brain volumes in overweight and obese elderly subjects. Obesity is therefore associated with detectable brain volume deficits in cognitively normal elderly subjects. Hum Brain Mapp, 2009. © 2009 Wiley-Liss, Inc.

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Article

## **Different Hippocampal Areas Implicated in Memory Loss**

TALAN, JAMIE

### ESSENCE OF ARTICLE

“Associate Professor of Neurology Scott A. Small, MD, who led the study, said that high blood glucose seems to lead to some of the memory problems that come with advancing age. If so, managing glucose levels could be key to preserving the formation of new memories, which makes it possible to remember new people or where you put your keys.”

### ARTICLE

Older people with type 2 diabetes and those who have had a brain infarct show damage in different areas of the hippocampus, which can cause age-related memory loss, according to a new report by investigators at the Columbia University Medical Center. The hippocampal regions they identified differ from those associated with Alzheimer disease (AD).

The findings, published in the December *Annals of Neurology*, offer a picture of the changing brain that may solve an age-old question about why humans naturally forget things as they get older. Type 2 diabetes and brain infarcts are rather common in advancing age, and this study is the first to explain why so many people without AD may show subtle cognitive problems as they age.

Associate Professor of Neurology Scott A. Small, MD, who led the study, said that high blood glucose seems to lead to some of the memory problems that come with advancing age. If so, managing glucose levels could be key to preserving the formation of new memories, which makes it possible to remember new people or where you put your keys.

Dr. Small and colleagues at Columbia University have been monitoring hundreds of older participants, age 65 and older, who have annual physical and mental exams as part of the 15-year longitudinal Northern Manhattan Study; the principal investigator is Richard Mayeux, MD, the Gertrude H. Sergievsky Professor of Neurology, Psychiatry, and Epidemiology. At baseline, study participants have no signs of dementia, but the investigators have been collecting data on those who go on to develop AD.

### STUDY PROTOCOLS

Dr. Small and his colleagues carried out functional MRI (fMRI) to assess basal cerebral blood volume in the 240 community-residing seniors. Sixty had type 2 diabetes, and 74 had brain infarcts on MRI. He found that people with diabetes and brain infarcts have different hippocampal lesions. The damaged area for diabetics was in the dentate gyrus - blood volume in the dentate gyrus was down by about 25 percent, while those with infarcts showed dysfunction in the CA1 and subiculum regions of the hippocampus. Dr. Small said that the effect that glucose had on the dentate gyrus was not seen in the fMRI of those with brain infarcts.

Cognitive tests show that people with old infarcts have more memory problems and are also at greater risk for stroke. By comparison, patients with AD show damage to the entorhinal cortex, which forms the main input to the hippocampus.

The scientists are now trying to figure out why the dentate gyrus is affected by the aging process, and whether there are ways to reverse the damage to this sliver of tissue.

Dr. Small and his colleagues say that these common age-related problems could explain the normal wear and tear of memory. That the dentate is involved is actually good news, said Dr. Small, as he and others have found that this region is the home to newly-formed neurons (neurogenesis), and physical exercise can enhance regional function there. In 2007, Dr. Small and colleagues reported in the Proceedings of the National Academy of Sciences that physical exercise in mice and humans selectively enhanced functioning of the dentate gyrus.

Dr. Small said that numerous and well-established studies show that abnormal elevation of blood glucose cause hippocampal-dependent memory loss. Working together with Carol Barnes, PhD, Regents' Professor of Psychology and Neurology and director of the Evelyn F. McKnight Brain Institute of University of Arizona, they confirmed the same blood glucose-related dentate damage in rhesus monkeys. And studies in mice showed that blood volume in the dentate gyrus was reduced by 35 percent after exposure to streptozosin, which killed islet cells of the pancreas and triggered high blood glucose.

Figure. FUNCTIONAL M...

Image Tools We are hoping that we can identify etiologies of normal aging, said Dr. Small. Processes like high cholesterol, high blood pressure, or diabetes may target the dentate and exacerbate memory problems.

Anything that improves our body's ability to process sugars would possibly be a good way to ameliorate age-related memory decline, Dr. Small said. He added that physical exercise does not change the function of the entorhinal cortex, which is damaged in AD.

Figure. DR. SCOTT A....

Image Tools

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QUESTIONING THE 'MEMORY GOSPEL'

Norman Relkin, MD, associate clinical professor of neurology and neuroscience at the Weill Cornell Medical College and director of the Cornell Memory Disorders Program, said that more work needs to be done before these findings become accepted as memory gospel.

It's important to distinguish age-related memory loss from changes in the brain in elderly patients with strokes and diabetes, Dr. Relkin added. Generally, we consider memory loss to be 'age-related' in the absence of specific pathology. I think it's more accurate to say that stroke and diabetes are common in the elderly and have been linked to memory loss and dementia. This study provides new evidence that diabetes can adversely affect older brains through mechanisms that are distinct from stroke. It provides further encouragement for testing whether memory loss in the elderly can be reduced by interventions such as exercise or better control of blood sugar in people with diabetes.

#### ARTICLE IN BRIEF

Neuroimaging revealed that seniors with diabetes and brain infarcts have different hippocampal problems. The damaged area for diabetics was in the dentate gyrus, while those with infarcts showed dysfunction in the CA1 and subiculum regions of the hippocampus.

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#### **"Measuring Procalcitonin May Help Reduce Overuse of Antibiotics for Lower Respiratory Tract Infections"**

CHICAGO -- September 8, 2009 -- The use of guidelines for treatment of lower respiratory tract infections (LRTIs) such as bronchitis and pneumonia determined by measurements of procalcitonin resulted in lower rates of antibiotic use and associated adverse effects, and similar rates of adverse outcomes compared with standard guidelines, according to a study published in the September 9 issue of *JAMA*.

An approach that has been suggested to estimate the probability of bacterial origin in LRTI is the measurement of serum procalcitonin (PCT), with evidence from smaller trials suggesting that use of clinical algorithms based on certain PCT measurements could lead to needed reductions in antibiotic use.

Philipp Schuetz, MD, University Hospital Basel, Basel, Switzerland, and colleagues conducted a large, multicentre trial to compare use of PCT guidelines with standard guidelines and subsequent antibiotic use.

The study, conducted at 6 tertiary care hospitals in Switzerland, included 1,359 patients with mostly severe LRTIs. Patients were randomised to administration of antibiotics based on a PCT algorithm with predefined cutoff ranges for initiating or stopping antibiotics (PCT group) or according to standard guidelines (control group). Serum PCT was measured locally in each hospital.

The researchers found that "the rate of overall adverse outcomes was similar in the PCT and control groups (15.4% vs 18.9%). The mean duration of antibiotics exposure in the PCT versus control groups was lower in all patients (5.7 vs 8.7 days; relative change, -34.8%) and in the subgroups of patients with community-acquired pneumonia (n = 925; 7.2 vs 10.7 days; -32.4%), exacerbation of chronic obstructive pulmonary disease (n = 228; 2.5 vs 5.1 days; -50.4%), and acute bronchitis (n = 151; 1.0 vs 2.8 days; -65.0%). Antibiotic-associated adverse effects were less frequent in the PCT group (19.8% vs 28.1%)."

"In conclusion, particularly in countries with higher antibiotic prescription rates than Switzerland, PCT guidance will have substantial clinical and public health implications to reduce antibiotic exposure and associated risks of adverse effects and antibiotic resistance," the authors wrote.

SOURCE: JAMA

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<http://clinicaltrials.gov/ct2/show/NCT00472667>

” Many clinical studies have shown that procalcitonin (PCT) is able to distinguish the inflammatory response to infection from other types of inflammation and to distinguish bacterial from viral infections.”

### **PROcalcitonin Reduce Antibiotic Treatments in Acute-Ill Patients (PRORATA)**

First Received: May 11, 2007 Last Updated: November 24, 2008 History of Changes

Sponsored by: Assistance Publique - Hôpitaux de Paris

Information provided by: Assistance Publique - Hôpitaux de Paris

ClinicalTrials.gov Identifier: NCT00472667

#### **Purpose**

The study is a prospective, randomized, controlled intervention trial conducted in 9 centers, comparing a conventional strategy versus a PCT-guided strategy to start or to discontinue antibiotics, in patients with suspected community or hospital- acquired infection.

#### **Condition**

## Intervention

Bacterial Infections      Procedure: Procalcitonin guided strategy

Study Type:      Interventional

Study Design:      Diagnostic, Randomized, Open Label, Active Control, Factorial Assignment, Safety/Efficacy Study

Official Title:      Impact of Procalcitonin to Reduce Antibiotics Use in ICU Adults Patients

Resource links provided by NLM:

MedlinePlus related topics: Antibiotics Bacterial Infections

Drug Information available for: Procalcitonin

U.S. FDA Resources

Further study details as provided by Assistance Publique - Hôpitaux de Paris:

Primary Outcome Measures:

- Exposition to antibiotics, defined by antibiotic-free days [ Time Frame: assessed 28 days after inclusion ] [ Designated as safety issue: Yes ]
- Mortality [ Time Frame: at Day 28 and Day 60 ] [ Designated as safety issue: No ]

Secondary Outcome Measures:

- Consumption of antibiotics expressed as the Defined Daily Dose/1000 ICU-days [ Time Frame: between D1 and D28 ] [ Designated as safety issue: Yes ]
- The length of ICU and hospital stay [ Time Frame: during the stay at the hospital ] [ Designated as safety issue: No ]
- The evolution of SOFA score parameters [ Time Frame: between D1 and D28 ] [ Designated as safety issue: No ]
- The number of mechanical ventilation-free days [ Time Frame: at D28 ] [ Designated as safety issue: No ]
- The acquisition cost of antibiotics [ Time Frame: between D1 and D28 ] [ Designated as safety issue: No ]
- The percentage of emerging multiresistant bacteria between D1 and D28, as assessed by microbiologic examination of all clinical samples. [ Time Frame: between D1 and D28 ] [ Designated as safety issue: No ]

- The percentages of relapses of infection [ Time Frame: between D1 and D28 ] [ Designated as safety issue: No ]

Enrollment: 630

Study Start Date: July 2007

Study Completion Date: May 2008

Primary Completion Date: May 2008 (Final data collection date for primary outcome measure)

Arms

Assigned Interventions

1: Experimental

Procalcitonin guided strategy

Detailed Description:

Clinical and laboratory signs are neither specific nor sensitive for diagnosis of sepsis in critically-ill patients. Because delaying antimicrobial therapy may be deleterious, broad-spectrum antibiotics are widely used in ICU -patients, even when they are not needed. In addition, only few well-designed studies concerning the duration of antibiotic treatment have been so far published. Consequently, many patients received antibiotics during the ICU stay. Many studies have shown that exposure to antibiotics, the so called "selection pressure" is an independent risk factor for acquisition of resistance in individual patients. Therefore, reducing antibiotic use is probably necessary to control antibiotic resistance. Many clinical studies have shown that procalcitonin (PCT) is able to distinguish the inflammatory response to infection from other types of inflammation and to distinguish bacterial from viral infections. Recent studies have shown that PCT guidance substantially and safely reduced antibiotic overuse in patients with lower respiratory tract infections. We aimed to evaluate the role of PCT in reducing the use of antibiotics in ICU adult patients. The study is a prospective, randomized, controlled intervention trial conducted in 9 centers, comparing a conventional strategy versus a PCT-guided strategy to start or to discontinue antibiotics, in patients with suspected community or hospital- acquired infection.

Eligibility

Ages Eligible for Study: 18 Years and older

Genders Eligible for Study: Both

Accepts Healthy Volunteers: No

Criteria

Inclusion Criteria:

- Patient hospitalised in the ICU

- Bacterial infection suspected
- At ICU admission the patient do not receive antibiotics or receive antibiotics for less than 24hours and an interval between admission and inclusion < 12 hours
- During ICU stay, provided that the interval between the start of suspected infection and inclusion is < 12hours
- Written inform consent from the patient or relatives. The consent may be obtained after the enrollment if the patient is not able to give consent and if there is no relatives

#### Exclusion Criteria:

- Age < 18 years
- Pregnancy
- Patient expected to remain hospitalised in the ICU for less than 3 days
- Neutropenia
- Infection or presumed infection requiring prolonged antibiotic therapy (endocarditis,osteo-articular infection, mediastinitis, deep abscess, tuberculosis, pneumocystis pneumonia, toxoplasmosis).
- Simplified Acute Physiology Score II at ICU admission (calculated during the first 12h)
- Attending physician declining to use full life support.

#### Contacts and Locations

Please refer to this study by its ClinicalTrials.gov identifier: NCT00472667

#### Locations

France

Chu Bichat Claude Bernard

PARIS, France, 75018

#### Sponsors and Collaborators

Assistance Publique - Hôpitaux de Paris

#### Investigators

Principal Investigator: Lila BOUADMA, MD Assistance Publique - Hôpitaux de Paris

#### More Information

No publications provided

Responsible Party: Department Clinical Research of Developpement ( Aurelie GUIMFACK )

Study ID Numbers: P060204, AOR06019

Study First Received: May 11, 2007

Last Updated: November 24, 2008

ClinicalTrials.gov Identifier: NCT00472667 History of Changes

Health Authority: France: Ministry of Health

Keywords provided by Assistance Publique - Hôpitaux de Paris:

Bacterial infections

Procalcitonin

Intensive care unit

Antibiotic therapy

Suspicion of bacterial infection or proven

Study placed in the following topic categories:

Bacterial Infections

Anti-Infective Agents

Anti-Bacterial Agents

Additional relevant MeSH terms:

Bacterial Infections

Anti-Infective Agents

Anti-Bacterial Agents Therapeutic Uses

Infection

Pharmacologic Actions

ClinicalTrials.gov processed this record on September 10, 2009

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