

More bacteria in the air than previously thought

Thousands of bacteria that change with the weather drift in the atmosphere

The air is a hostile place for a bacteria. Often dry, lacking in nutrients and filled with deadly ultraviolet radiation, the atmosphere would seem to be the last place a bacteria would want to find itself. Yet, a new genetic census of some air samples from Austin and San Antonio, Tex., finds that as many as 2,000 different kinds of bacteria may be present in the air we breathe on any given day.

Microbial ecologist Gary Andersen of Lawrence Berkeley National Laboratory and his colleagues collected air samples in the two Texas cities over a period of 17 weeks, starting in

2003. They then used a specially designed microarray--a small chip roughly the size of a quarter that carries probes to detect specific genetic information--to search for a gene involved in the making of a protein (16S) that is found in many bacteria. "We designed a 500,000-probe array to identify up to about 9,000 different groups of bacterial and archaean organisms," Andersen explains. "It looks at the differences in the 16S sequence to identify a specific type of prokaryotic organism."

In the air samples, the researchers uncovered at least 1,800 different types of microbes, including those such as the diarrhea-causing *Arcobacter* and ulcer-inducing

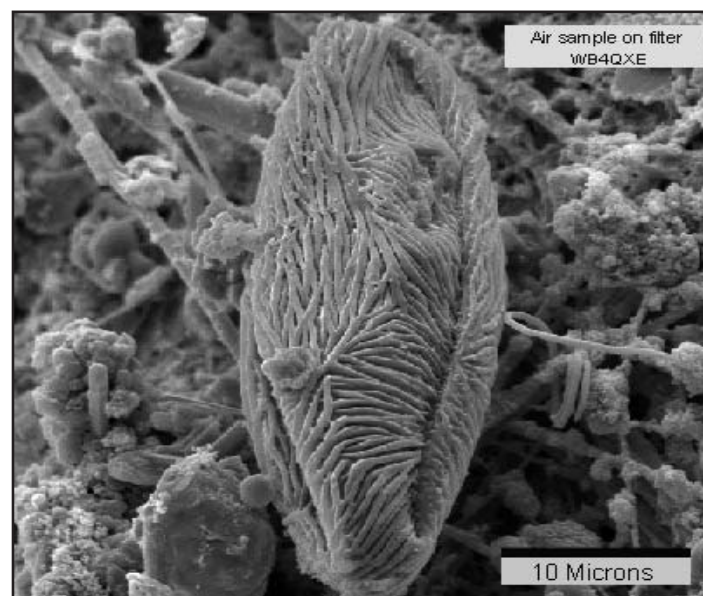
Heliobacter genera that can be dangerous to human health. Previous efforts to determine bacteria counts in the atmosphere had relied on culturing the air to see what grew. "Over 90 percent you can't recover even though it was not only present but viable," Andersen notes. "It's just something about the physiological state it gets in; when it's not in rich media, it has a different physiology."

This puts the diversity of bacteria in the air on par with the diversity of bacteria in the soil, a fertile environment for such life-forms. In fact, there is a large crossover between the bacteria in the air of a city and the bacteria in its soil. The ecologists found that airborne bacte-

ria were broadly the same in Austin and San Antonio as well, and varied more depending on the weather than any other factor.

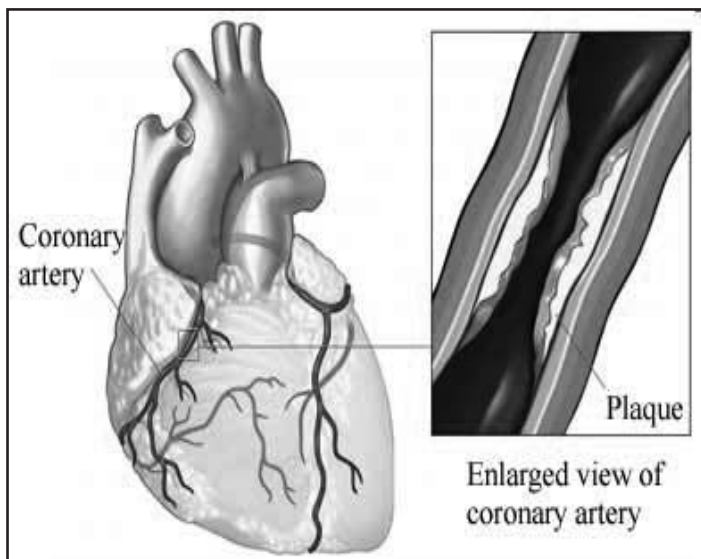
The most common bacteria included those that thrive in hay fields and deteriorating exterior paint, according to the paper published online December 18 in *Proceedings of the National Academy of Sciences USA*. "We were surprised at how many different types of sequences we were seeing," Andersen adds. "Obscure phyla, like TM7, which have been seen in soil and gum tissue; hot springs type organisms; and bacteria from sewage treatment plants."

The census provides a back-



ground for ongoing efforts by the U.S. Department of Homeland Security to monitor city air for potential bioterrorism
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Congenital heart disease increasingly more common in adults, children



American Heart Association rapid access journal report

The prevalence of congenital heart disease (CHD) has increased strikingly in adults and children in a new population study, researchers reported in *Circulation: Journal of the American Heart Association*.

Severe CHD has risen in adults by 85 percent and 22 percent in children during the 15-year study (1985-2000). Congenital heart defects are structural problems arising from abnormal formation of the heart or major blood vessels near the heart that occurs before birth. Most heart defects either obstruct blood flow in the heart

or vessels near it, or cause blood to flow through the heart in an abnormal way.

"This is the first study to measure the changing number of patients in a North American population during a period of major progress in the management of CHD," said Ariane J. Marelli, M.D., lead author of the study and director of the McGill Adult Unit for Congenital Heart Disease Excellence at McGill University in Montreal, Quebec, Canada.

The study measured prevalence, age and proportion of adults relative to children at four time points: 1985, 1990, 1995 and 2000, and analyzed the Quebec administrative databases recorded for the general population where access to health care is universal. Quebec accounts for 25 percent of Canada's population.

"This is the largest population study of CHD to have been per-

formed in North America," Marelli said. "There is no reason to believe that the predominantly Caucasian population of Quebec and Canada is different from the United States."

Extrapolating the study findings to the U.S. population, Marelli estimated 1.8 million Americans had CHD in 2000 and that this number is increasing and will have implications for women, pregnancy and genetics. She estimated about 900,000 adults and 900,000 children had CHD.

In 2000, the study indicated that one of every 85 children had CHD and one of 250 adults had CHD.

"For comparison purposes, cystic fibrosis occurs in one of 4,500 live births, so there are 45 times more children with CHD than children with cystic fibrosis and most of these children are now becoming adults," Marelli said.

Furthermore, more adults have had CHD than children since 1985, and a preponderance are women, the study found.

"Between 1985 and 2000, the group of patients that rose the most rapidly were adults with severe CHD, so, as of 2000, there was a nearly equal number of children and adults with severe CHD," Marelli said.

The most significant increases in CHD were in adolescents (13 to 17 years old) and in young adults (18 to 25), according to the study. The median age of those with severe CHD increased markedly from 1985 to 2000. The median age in 1985 was 11 years compared to 17 years in 2000.

"CHD has been thought of as a disease of childhood, but it has become an important disease of adulthood as well," Marelli said. Researchers said the significant new data in the

study reflects advances in the diagnosis and surgical treatment of CHD.

"Since the mid-1980s, the advent of cardiac ultrasound has improved the diagnosis of CHD," Marelli said. "This technique can be used to detect CHD beyond the first year of life. Advances in corrective pediatric cardiac surgery have made an impact, enabling children with CHD to live longer." Marelli considers CHD a major public health problem in North America that is largely unrecognized.

"The increasing prevalence of CHD means these children will live longer and acquire other forms of heart disease," Marelli said. "We need to increase public awareness for congenital heart disease in order to be able to better care for the increasing number of young people with heart disease."

Vision Loss Can Be Prevented in People With Diabetes

The millions of Americans afflicted with Type 1 and 2 Diabetes face many potential complications, including: heart and kidney disease; nerve damage and stroke; foot and skin problems; and gastrointestinal disorders and hypoglycemia.

Another major complication, affecting up to 24,000 new people per year, is permanent blindness due to diabetic retinopathy, a degenerative disease of the retina (the sensitive area at the back of the eye). Overall, diabetic retinopathy affects 5.3 million Americans 18 and older.

But there's hope. The American Academy of Ophthalmology wants Americans to know that even though diabetes is the leading cause of new cases of blindness, vision loss can be prevented if the disease is diagnosed and treated in time.

"Only 50 to 60 percent of those with diabetes get the recommended yearly eye examinations," said Jose S. Pulido, MD, Academy clinical correspondent and professor of ophthalmology at the Mayo Clinic in Rochester, Minn. "Studies show effective treatments, including an annual dilated eye exam, can reduce severe vision loss by up to 94 percent."

According to the American Diabetes Association, there are 20.8 million people in the United States, or 7 percent of the population, who have diabetes. While an estimated 14.6 million have been diagnosed, 6.2 million people (or nearly one-third) are unaware that they have the disease.

"This is a tragedy waiting to happen because people who are unaware they have the disease are at a substantially greater risk for vision loss and other

complications," said Dr. Pulido. "The first step in preventing complications is finding out if you have the disease. It's important for all healthy adults over the age of 45 to have a blood sugar test once every three years."

Dr. Pulido said that the longer a person has diabetes, the greater the risk for developing diabetic retinopathy.

"Diabetic retinopathy does not only affect people who have had diabetes for many years, it can also appear within the first year or two after the onset of the disease," he said. "For some people, diabetic retinopathy is one of the first signs of the disease."

Anatomy of Diabetic Retinopathy High blood sugar levels weaken blood vessels in the eye's retina, causing them to leak blood or fluid. This causes the retina to swell and can lead to vision loss.

Blood sugar fluctuations can also promote growth of new, fragile blood vessels on the retina, which can easily break and leak blood into the vitreous (the clear, jelly-like substance that fills the center of the eye). This can blur vision and lead to permanent blindness.

In its earliest stages diabetic retinopathy may not affect vision, but over time it can cause vision loss and even blindness in both eyes.

What are the Signs of Diabetic Retinopathy? "Fluctuations in blood sugar levels can temporarily affect vision, so it's sometimes difficult to know if a serious eye problem is developing," said Dr. Pulido. "That's one of the reasons strict control of your blood sugar is so important. If you notice a vision change in one eye, a change that lasts more than a day or two, or



changes not associated with fluctuations in blood sugar, contact your Eye M.D. immediately."

Diabetes: Maintaining a healthy diet is important

Eating Right

Maintaining a healthy diet is important for everyone, but it is especially important for people with diabetes. Following the right meal plan can make all the difference to a person struggling to keep their blood sugar under control. But, what is the right meal plan? How much of which food group should you eat?

Along with a visit to a dietician, this guide should help answer questions you may have.

Understanding Carbohydrates and Fiber

Carbohydrates are one of the major food categories (the others include proteins and fats). They provide fuel for the body in the form of glucose. Glucose is a sugar that is the primary means of energy for all of the body's cells.

There are two ways to classify carbohydrates -- simple and complex. Simple carbohydrates are sugars -- like glucose, sucrose, lactose and fructose. They are found in refined sugar and in fruits. Complex carbohydrates are the starches, which are the simple sugars bonded together chemically -- they are found in beans, nuts, vegetables and whole grains. Complex carbohydrates are considered healthier mostly because they are digested by the body slowly, providing a steady source of energy. They also contain valuable amounts of fiber.

Carbohydrates, rather than fats or proteins, have the most immediate effect on your blood glucose since carbohydrates are broken down directly into sugar early during digestion. It is important to eat the suggested amount of carbohydrate at each meal, along with some protein and fat.

Carbohydrates are mainly found in the following food groups:

- Fruit
- Milk and yogurt
- Bread, cereal, rice, pasta
- Starchy vegetables

What Is Carbohydrate Counting?

Carbohydrate counting is a method of meal planning that is a simple way to keep track of the amount of total carbohydrate you eat each day. It helps allow you to eat what you want. Counting grams of carbohydrate and evenly distributing them at meals will help you control your blood glucose.

Instead of following an exchange list, with carbohydrate counting you monitor how much carbohydrate (sugar and starch) you eat daily. One carbohydrate serving is equal to 15 grams of carbohydrate.

With carbohydrate counting, you plan your carbohydrate intake based on what your pre-meal

sugar is and your intake or insulin dose can be adjusted. Carbohydrate counting can be used by anyone and not just by people with diabetes that are taking insulin. If you eat more carbohydrates than your insulin supply can handle, your blood glucose level goes up. If you eat too little, your blood glucose level may fall too low. These fluctuations can be managed by knowing how to count your carbohydrate intake.

A registered dietitian will help you figure out a carbohydrate counting plan that meets your specific needs. For adults, a typical plan generally includes three to four carbohydrates at each meal, and one to two carbohydrate servings as snacks.

With carbohydrate counting, you can pick almost any food product off the shelf, read the label, and use the information about grams of carbohydrates to fit the food into your meal plan.

Carbohydrate counting is most useful for people who take multiple daily injections of insulin, use the insulin pump or who want more flexibility and variety in their food choices. However, it may not be for everyone, and the traditional method of following food exchange lists may be used instead.

How Much Fiber Should I Eat?

Fiber is the indigestible part of plant foods. It plays an important role in the digestive process as



it helps move foods along the digestive tract, adding bulk to stool to help it pass through the bowel. In addition, diets high in fiber are associated with lower risks of obesity, hypertension, heart disease and strokes.

Fiber also:

- Delays sugar absorption, helping to better control blood glucose levels.
- Binds with cholesterol and may reduce