New pathogen contributes to ECC

Researchers at The Forsyth Institute have made a significant discovery about the nature of childhood dental disease. The scientific studies led by Anne Tanner, BDS, PhD, identified a new pathogen connected to severe early childhood caries.

This bacterium, *Scardovia wiggsiae*, was present in the mouths of children with severe early childhood caries (ECC) when other known pathogens such as *Streptococcus mutans* were not detected. This research may offer the potential to intervene and halt the progression of disease.

Early childhood caries is the most common chronic infectious disease of childhood in the United States. Severe ECC can destroy primary teeth, cause painful abscesses and is the major reason for hospital visits for young children. This condition disproportionately affects disadvantaged socio-economic groups.

This research, which will be published in the April issue of the Journal of Clinical Microbiology, provides new insight on the microbiota of severe ECC. Dental caries is caused by an interaction between bacteria, host susceptibility and a carbohydrate diet that contains high amounts of sugar.

Tanner published an updated evaluation of the diet associated with severe ECC in collaboration with Dr. Carole Palmer at Tufts University in the Journal of Dental Research in 2010.

The bacterial species *S. mutans* is widely recognized as the primary pathogen in early childhood caries. However, it is also present in people without disease and is not detected in all cases of childhood caries. This suggests that other species such as *S. wiggsiae* are also disease-causing pathogens.

“In my work, I have seen the tremendous public health impact of severe early childhood caries,” said Tanner, a senior member of staff in the department of molecular genetics at The Forsyth Institute. “Understanding the causes of severe dental decay in young children is the first step in identifying an effective cure.”

Summary of study

Severe early childhood caries, while strongly associated with *S. mutans*

Ancient teeth raise new questions

By Gail Glover, Binghamton University

Eight small teeth found in an Israeli cave raise big questions about the earliest existence of humans and where we may have originated, Binghamton University anthropologist Rolf Quam says.

Quam is part of an international team of researchers, led by Israel Hershovitz of Tel Aviv University, that has examined the dental discovery and recently published joint findings in the American Journal of Physical Anthropology.

Excavated at Qesem cave, a prehistoric site near Rosh Ha'ain in central Israel that was uncovered in 2000, the teeth are similar in size and shape to those of modern man, *Homo sapiens*, which have been found at other sites in Israel, such as...
BMP improves implant success

By Paula Hinley, Georgia Health Sciences University

Using a bone-creating protein to augment the maxillary sinus could improve dental implant success, according to Georgia Health Sciences University (GHSU) researchers.

Dental implants won’t work if the bone in which they are anchored is too thin. Bone-thinning is a common cause and consequence following tooth loss.

The currently favored solution is to supplement the area with bone grafts to stabilize the implant base. But that technique is problematic “primarily because it involves additional surgeries to harvest the bone,” said Dr. Ulf M.E. Wikesjö, interim associate dean for research and enterprise in the GHSU College of Dental Medicine.

In animal studies, he and his team at the GHSU Laboratory for Applied Periodontal and Craniofacial Regeneration found that when implanting bone morphogenetic protein (BMP) in the sinus, new bone will form within four weeks than using conventional bone grafting at the same site.

“We found that BMP induced superior bone quality over that following bone grafts, which improves the chances for successful implants,” Wikesjö said. “BMP is phenomenal, because it forms bone, off-the-shelf product with ease of use that can produce real results, and it could be the new gold standard for this procedure.”

According to the American Association of Oral and Maxillofacial Surgeons, 89 percent of adults ages 55-64 have lost at least one tooth due to decay, disease or trauma, and 26 percent of adults have lost all permanent teeth by age 74.

Both of these dental implants were available, the only options for replacing these missing teeth were dentures and dental bridges, both of which can lead to further bone loss. Implants provide patients with numerous benefits, including improved oral health, appearance, speech, convenience, durability and the ability to eat.

The findings of his team’s pilot study were presented at the Academy of Osseointegration annual meeting in Washington, D.C. Wikesjö, who is currently the director of GHSU co-investigator research at The Forsyth Institute, said their study was conducted with collaborators at the Goldman School of Dental Medicine, Boston University and Tufts University School of Dental Medicine, and with Dr. Floyd Dewhirst and resources of the HOMD at The Forsyth Institute.

The HOMD links several types of information on oral microbes to a consistent naming system. The HOMD contains descriptions of the microbes, their metabolism and their relationship with other microbes.

In addition, the HOMD contains descriptions of the microbes, their metabolism and their ability to cause disease along with information on their DNA and proteins, as well as to the scientific literature.

References


(Source: The Forsyth Institute)
Oafzeh and Skhul — but they’re a lot older than any previously discovered remains.

“The Qesem teeth come from a time period between 200,000 and 400,000 years ago when human remains from the Middle East are very scarce,” Quam says. “We have numerous remains of Neanderthals and *Homo sapiens* from more recent times, that is around 60,000 to 150,000 years ago, but fossils from earlier time periods are rare. So these teeth are providing us with some new information about who the earlier occupants of this region were as well as their potential evolutionary relationships with the later fossils from this same region.”

The teeth also present new evidence as to where modern man might have originated. Anthropologists believe that modern humans and Neanderthals shared a common ancestor who lived in Africa more than 700,000 years ago. Some of the descendants of this common ancestor migrated to Europe and developed into Neanderthals. Another group stayed in Africa and evolved into *Homo sapiens*, later migrating out of the continent.

If the remains from Qesem can be linked directly to the *Homo sapiens* species, it could mean that modern man either originated in what is now Israel or may have migrated from Africa far earlier than is now thought.

Quam says the verdict is still out as to which species is represented by these eight teeth, which poses a challenge for any kind of positive identification.

“While a few of the teeth come from the same individual, most of them are isolated specimens,” Quam says. “We know for sure that we’re dealing with six individuals of differing ages. Two of the teeth are actually deciduous or ‘milk’ teeth, which means that these individuals were young children. But the problem is that all the teeth are separate so it’s been really hard to determine which species we’re dealing with.”

Quam says that rather than rely on individual features, anthropologists use a combination of characteristics to get an accurate reading on species type. For instance, Neanderthals have relatively large incisors and distinctive molars and premolars, whereas *Homo sapiens*’ teeth are smaller with incisors that are straighter along the “lip” side of the face. Sometimes the differences are subtle, but it’s these small changes that make having a number of teeth from the same individual that much more important.

Even though Quam and his colleagues don’t know for sure which species the teeth belong to, these dental records still tell them a lot about the past.

“Teeth are evolutionarily very conservative structures,” Quam says. “And so any differences in their features can provide us with all sorts of interesting information about an individual. It can tell us what they ate, what their growth and development patterns looked like as well as what their general health was like during their lifetime. They can also tell us about the evolutionary relationships between species, all of which adds to our knowledge of who we are and where we came from.”

Excavation continues at the Qesem site under the direction of Avi Gopher and Ran Barkai of Tel Aviv University. The archaeological material already recovered includes abundant stone tools and animal remains, all of which are providing researchers with a picture of daily life and hunting practices of the site’s former inhabitants.

“This is a very exciting time for archaeological discovery,” Quam says. “Our hope is that the continuing excavation at the site will result in the discovery of more complex remains, which would help us pinpoint exactly which species we are dealing with.”

Quam continues to be in touch with the on-site archeologists and hopes to collaborate in the project if more complete human remains are recovered.