Saraswati Dental College, Faizabad Road, Lucknow

Science Update Notice Board

August 2015

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NYU study successfully screens for diabetes at dental visits using oral blood

Last updated: Monday 2 March 2015

Researchers find a 99 percent correlation between tests for **Hemoglobin A1c at** dental visits using finger stick and oral blood.

It is estimated that 8.1 million of the 29.1 million Americans living with **diabetes** are undiagnosed and many who have diabetes have poor glycemic control. Given that each year many Americans visit a dental provider but not a primary care provider, dental visits may be an opportune site for diabetes screening and monitoring glucose control for many at-risk patients.

Now, a new study published in the *American Journal of Public Health* confirms that using gingival crevicular blood (GCB) for hemoglobin A1c (HbA1c) testing produced values that were nearly identical to those obtained using finger stick blood (FSB), with a correlation of .991 between the two blood samples of 408 dental patients. Testing HbA1c is promoted by the American Diabetes Association (ADA) for diabetes diagnostic purposes and glycemic control monitoring.

"**In light of findings from the study, the dental visit could be a useful opportunity to conduct diabetes screening among at-risk, undiagnosed patients - an important first step in identifying those who need further testing to determine their diabetes status**," said the study's principal investigator, Dr. Shiela Strauss, Associate Professor of Nursing and Co-Director of the Statistics and Data Management Core for NYU's Colleges of Nursing and Dentistry.

The study, "The Potential for Glycemic Control Monitoring and Screening for Diabetes at Dental Visits Using Oral Blood," builds upon an earlier pilot study in which the feasibility and acceptability to patients and dental providers of using oral blood to screen for diabetes during a routine dental exam was demonstrated.

While all persons at-risk for diabetes who were never told they had the condition can potentially benefit from additional opportunities for diabetes screening, Dr. Strauss and her team found that participants who were at least forty-five years old might especially reap great benefit from diabetes screening at dental visits.

The researchers also noted that HbA1c testing at dental visits could serve as an additional opportunity to determine the extent of glycemic control among those already diagnosed.

"Our study has considerable public health significance because we identify the value and importance of capitalizing on an opportunity at the dental visit (a) to screen at-risk, but as yet undiagnosed patients for diabetes (especially those 45 years or older) and (b) to monitor glycemic control in those already diagnosed so as to enable them to maintain their health to the greatest extent possible," said Dr. Strauss.

QUOTE OF THE DAY

Life's most persistent and urgent question is, 'What are you doing for others?' ..... Martin Luther King, Jr.

http://www.medicalnewstoday.com/releases/289935.php

Amelotin molecule plays a critical role in tooth enamel maturation

Last updated: Friday 27 February 2015

The International and American Associations for Dental Research (IADR/AADR) have published an innovative developmental biology study by lead researcher Bernhard Ganss, University of Toronto, ON, Canada, that **relates amelotin with tooth enamel defects and enamel formation**. This study, titled "Enamel Hypomineralization and Structural Defects in Amelotin-deficient Mice," is published in the OnlineFirst portion of the *Journal of Dental Research*: the journal for dental, oral and craniofacial research.

Among the proteins necessary for enamel formation, **amelotin (AMTN) is one of the more recently discovered proteins**. AMTN is predominantly expressed by ameloblasts during the maturation stage of amelogenesis and present at lower levels in the junctional epithelium of erupted teeth. Previous studies have suggested a function of this protein in enamel mineralization and cell attachment. Genetic mouse models have been instrumental in defining the role of many enamel-related proteins, but a genetic mouse model lacking the AMTN gene has been lacking.

Ablation of AMTN expression resulted in weak mandibular incisor-edge enamel that fractured and chipped. Microscopic analysis revealed that enamel mineralization was delayed, resulting in retention of organic matrix below the enamel surface. During the secretory stage, the ameloblasts showed prominent Tomes' processes therefore there was no indication of disruption of cell structures or activities. However, during maturation phase, volumetric growth of enamel rods was significantly reduced which led to hypomineralization. The expression levels of other enamel matrix proteins and enamel proteases, were not significantly altered, although the expression of an enamel protease, KLK-4, was delayed.

Although AMTN is expressed in the junctional epithelium, the knockout mice appear to have an intact dentogingival attachment. These observations indicate that **AMTN plays a subtle yet critical role in enamel biomineralization, particularly during the establishment of the outer and surface enamel layers. This role appears to be largely independent of other enamel proteins.**

"This is a significant study because it is the first report of a basement membrane protein playing a role in enamel mineralization," said JDR Associate Editor "Through creation of AMTN knockout mice, we learn unique role of AMTN in proper hardening of enamel."

QUOTE OF THE DAY

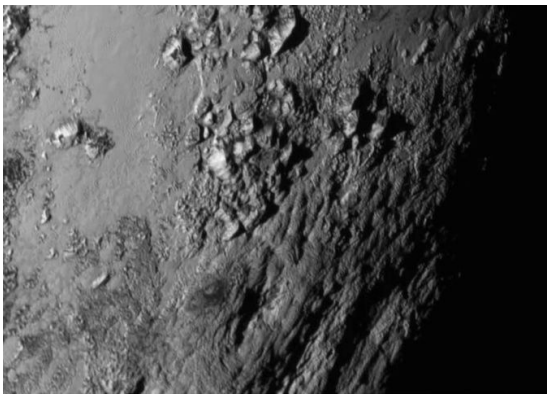
Start by doing what's necessary; then do what's possible; and suddenly you are doing the impossible ..... **Francis of Assisi**

http://www.rediff.com/news/report/pix-first-photos-a-whole-new-world-on-pluto/20150716.htm

FIRST PHOTOS: A whole new world on Pluto

Last updated on: July 16, 2015 12:34 IST

The mind-blowing dwarf planet has Ice Mountains and water



A close-up image of a region near Pluto's equator reveals a range of Youthful mountains

Pluto

It has been relegated to a dwarf planet. NASA scientists expected little from their first mission to Pluto - probably craters and nothing more. But Pluto turned out to be full of surprises. The first batch of close-up images was released on Wednesday, a day after NASA's New Horizons spacecraft flew past the former ninth planet. The **probe travelled more than 3.6 million miles** and unraveled a whole new world. "I'm completely surprised," said Alan Stern, Principal Investigator for NASA's New Horizons spacecraft. **Pluto's largest moon Charon has youthful terrain and a dark area nicknamed 'Murder'.**

New close-up images of a region near Pluto's equator reveal a giant surprise: a range of youthful mountains rising as high as 11,000 feet above the surface of the icy body. The mountains likely formed no more than 100 million years ago, said Geology, Geophysics and Imaging team leader Jeff Moore of NASA's Ames Research Center in Moffett Field, California.

"This is one of the youngest surfaces we've ever seen in the solar system," said Moore. Unlike the icy moons of giant planets, Pluto cannot be heated by gravitational interactions with a much larger planetary body. Some other process must be generating the mountainous landscape. "This may cause us to rethink what powers geological activity on many other icy worlds," said GGI deputy team leader John Spencer of the Southwest Research Institute in Boulder, Colorado.

The mountains are probably composed of Pluto's water-ice "bedrock." Although methane and nitrogen ice covers much of the surface of Pluto, these materials are not strong enough to build the mountains. Instead, a stiffer material, most likely water-ice, created the peaks.

"At Pluto's temperatures, water-ice behaves more like rock," said deputy GGI lead Bill McKinnon of Washington University, St Louis. The photos released by NASA also give a new, crisp view of Pluto's largest moon Charon. Scientists are surprised by the apparent lack of craters. The images reveal an intriguing world with a swath of cliffs and troughs stretching about 600 miles (1,000 kilometers) and a canyon 4 to 6 miles (7 to 9 kilometers) deep. New Horizons also observed the smaller members of the Pluto system, which includes four other moons: Nix, Hydra, Styx and Kerberos. A new sneak-peak image of Hydra is the first to reveal its apparent irregular shape and its size, estimated to be about 27 by 20 miles (43 by 33 kilometers), said NASA in a statement.

New Horizons is now more than a million miles on the other side of Pluto. The probe will keep flying out into the Kuiper Belt. NASA may extend its mission and send it to explore another small world.

QUOTE OF THE DAY

Education is the most powerful weapon which you can use to change the world

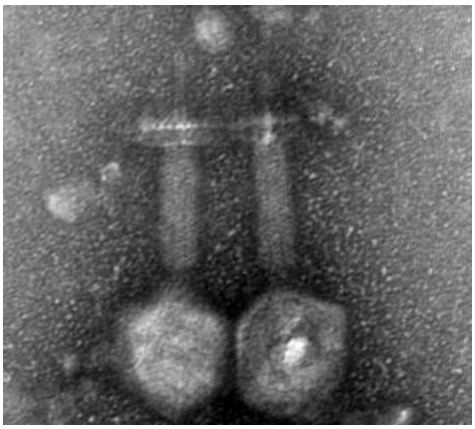
Nelson Mandela

http://www.medicalnewstoday.com/articles/289641.php

Virus found in sewage shows promise in treating dental procedure infections

Last updated: Thursday 19 February 2015

The rise of superbugs is spurring research into alternative ways of fighting resistant bacteria that cause serious infections. One such avenue is a revival of an old idea - using viruses to infect and eliminate bacteria.



30,000 times magnified image of phages shows some still binding to dead bacteria

Bacteriophages - or "phages" - are viruses that infect bacteria. Through a long history of co-evolution with bacteria, they have evolved into highly effective "professional killers" of the bugs. Back in the days when drugs were first developed as a way to treat bacterial infections, scientists were already thinking about using phages to fight bacteria, but then put the idea to one side as antibiotics became successful. Now, decades later - as we face the daunting prospect of a post-antibiotic era - the idea of using phages or viruses to kill bacteria is receiving attention again. A good example is a new study from researchers at the Hebrew University of Jerusalem's Faculty of Dental Medicine, who describe their findings in the journal Applied and Environmental Microbiology.

An intriguing fact about the virus the team studied - a phage called EFDG1 - is that they isolated it from Jerusalem sewage. **The study shows that EFDG1 could be an effective way to kill a very stubborn, drug-resistant bacterium called** ***Enterococcus faecalis*** **that can sometimes cause infections following dental procedures**. *E. faecalis* is a bacterium found in the human gastrointestinal tract. It is a dangerous pathogen that causes endocarditis (potentially fatal heart infection), bacteremia (harmful bacteria in the bloodstream) and other serious infections, such as urinary tract infection, meningitis and - as in the subject of this study - **post-treatment root canal infection**. One of the things that make *E. faecalis* difficult to treat is because it forms a biofilm - where the bacterial cells cluster and stick to surfaces by excreting a slimy, glue-like substance. *E. faecalis* is often recovered from persistent infections associated with root canal treatments and infection can persist in up to a third of root canals. This high rate of infection limits the choice of treatment options, so

researchers are keen to find ways to eliminate *E. faecalis*, especially when in biofilm form. The phage almost entirely eradicated *E. faecalis* in liquid culture and biofilm**.**

For their study, the team tested how well EFDG1 killed *E. faecalis* cells - both in a liquid culture and in biofilm form. They already knew the phage was capable of infecting the V583 strain of *E. faecalis*, which is resistant to vancomycin, the most effective antibiotic against the bacterium. The tests showed EFDG1 almost entirely eradicated *E. faecalis* - both in liquid culture and biofilm form. The team also showed **EFDG1 was highly effective at eliminating *E. faecalis* in tissue examples of root canal infection, suggesting that phage therapy using EFDG1 might be an effective way to prevent *E. faecalis* infection following root canal procedures**. Using transmission electron microscopy and whole genome sequencing, the team also determined that the EFDG1 phage belongs to a subfamily of the *Myoviridae* phages, which may offer other candidates for treating bacterial infections. The team also found that the EFDG1 genome does not appear to contain harmful genes, suggesting it may be safe to test its effectiveness at dealing with *E. faecalis* in humans.

One of the study leaders, Dr. Ronen Hazan, from the Institute of Dental Sciences at the Hebrew University, says: "As this research shows, bacteriophages may prove an effective tool in the development of much-needed new antimicrobial drugs." In November 2014, *Medical News Today* learned of another study reported in the same journal that **showed saliva protects teeth against cavities more than we thought**. **It appears that salivary mucus contains compounds that actively protect teeth from damage by the cavity-causing bacterium *Streptococcus mutans*.**

QUOTE OF THE DAY

If the only prayer you ever say in your entire life
is thank you, it will be enough
…Meister Eckhart

http://www.diabetes.co.uk/what-is-hba1c.html

Guide to HbA1c

The term HbA1c refers to glycated haemoglobin. It develops when haemoglobin, a protein within red blood cells that carries oxygen throughout the body, joins with glucose in the blood, becoming 'glycated' and identified average glucose concentration.By measuring glycated haemoglobin (HbA1c), clinicians are able to get an overall picture of what our average blood sugar levels have been over a period of weeks/months.For people with diabetes this is important as the higher the HbA1c, the greater the risk of developing diabetes-related complications. HbA1c is also referred to as haemoglobin A1c or simply A1c.

When the body processes sugar, glucose in the bloodstream naturally attaches to haemoglobin.The amount of glucose that combines with this protein is directly proportional to the total amount of sugar that is in your system at that time.Because red blood cells in the human body survive for 8-12 weeks before renewal, measuring glycated haemoglobin (or HbA1c) can be used to reflect average blood glucose levels over that duration, providing a useful longer-term gauge of blood glucose control.If blood sugar levels have been high in recent weeks, HbA1c will also be greater.

HbA1c targets	mmol/mol	%
Non-diabetics	20 - 41 mmol/mol	4% - 5.9%
Diabetics	48 mmol/mol	6.5%
Diabetics at higher risk of hypoglycemia	59 mmol/mol	7.5%

HbA1c levels between 5.7% and 6.4% indicate increased risk of diabetes (prediabetes).

Two large-scale studies - the UK Prospective Diabetes Study (UKPDS) and the Diabetes Control and Complications Trial (DCCT) - demonstrated that improving HbA1c by 1% (or 11 mmol/mol) for people with type 1 diabetes or type 2 diabetes cuts the risk of microvascular complications [e.g., Retinopathy, Neuropathy, Diabetic nephropathy (kidney disease)] by 25%. Research has also shown that people with type 2 diabetes who reduce their HbA1c level by 1% are:

- 19% less likely to suffer cataracts
- 16% less likely to suffer heart failure
- 43% less likely to suffer amputation or death due to peripheral vascular disease

HbA1c differ from a blood glucose level in that:

- HbA1c provides a longer-term trend, similar to an average, of how high your blood sugar levels have been over a period of time.
- An HbA1c reading can be taken from blood from a finger but is often taken from a blood sample that is taken from your arm.
- Blood glucose level is the concentration of glucose in your blood at a single point in time, i.e. the very moment of the test.This is measured using a fasting plasma glucose test, which can be carried out using blood taken from a finger or can be taken from a blood sample from the arm.However, fasting glucose tests provide

an indication of current glucose levels only, whereas the HbA1c test serves as an overall marker of what your average levels are over a period of 2-3 months.

- HbA1c can be expressed as a percentage (DCCT unit) or as a value in mmol/mol (IFCC unit). Since 2009, mmol/mol has been the default unit to use in the UK.Note that the HbA1c value, which is measured in mmol/mol, should not be confused with a blood glucose level which is measured in mmol/l. You can use HbA1c conversion tool to switch between the two measurement units.
- HbA1c is a measure of how well controlled your blood sugar has been over a period of about 3 months. It essentially gives a good idea of how high or low, on average, your blood glucose levels have been.Generally speaking, the lower HbA1c value, the better.

Everyone with diabetes mellitus should be offered an HbA1c test at least once a year. Some people may have an HbA1c test more often. This may be more likely if you have recently had your medication changed or your health team are otherwise wishing to monitor your diabetes control more than once a year.

HbA1c & Glucose Blood Levels		
HbA1c (%)	HbA1c (mmol/mol)	Ave. Blood Glucose (mmol/L)
13	119	18
12	108	17
11	97	15
10	86	13
9	75	12
8	64	10
7	53	8
6	42	7
5	31	5

Although HbA1c level alone does not predict diabetes complications, good control is known to lower risk of complications.Table shows how average blood sugar levels in mmol/L would be translated into HbA1c readings, and vice versa.It is important to note that because blood glucose levels fluctuate constantly, literally on a minute by minute basis, regular blood glucose testing is required to understand how your levels are changing through the day and learning how different meals affect your glucose levels.

HbA1c and Pregnancy

Keeping blood sugar levels under control is hugely important for women who either have diabetes going into pregnancy or who develop diabetes during their pregnancy.Tight blood glucose control helps increase the chances of a successful pregnancy by cutting the risk of complications for your baby.If you have diabetes, one of the ways your doctor or nurse will monitor your glycemic control is by carrying out an HbA1c testthat measures glycated haemoglobin - a molecule within red blood cells that naturally bonds with glucose - to get a good indication of your average blood glucose over the past 8-12 weeks.This guide outlines when your HbA1c readings will be taken and what HbA1c values should be before (planning stage), during and after pregnancy.

Planning pregnancy

The NICE guidelines for Diabetes in Pregnancy (Clinical Guideline 63) state that women with diabetes should aim to achieve an HbA1c result of 43 mmol/mol (6.1%) or lower.If you are planning to become pregnant, you should be offered an HbA1c measurement on a monthly basis to help monitor your blood glucose control.Meeting the target will help to minimise the risk of the baby developing risk of congenital malformations.If you have an HbA1c above 10%, it is strongly advised to avoid becoming pregnant until good diabetes control is achieved and sustained.

During pregnancy

During the first trimester of pregnancy, the HbA1c target for women with diabetes is the same as for planning a pregnancy that is 43 mmol/mol (6.1%) or lower.During the second and third trimesters of pregnancy, from week 13 onwards, HbA1c should not be used for assessing blood glucose control.Throughout pregnancy, women with diabetes should aim to meet the following blood glucose targets:

- Before meals: 3.5 to 5.9 mmol/l
- 1 hour after meals: 7.8 mmol/l or under

If pregnancy has occurred unplanned, it is important to aim to reach the HbA1c target of 43 mmol/mol as soon as possible.Some women may find this difficult. In this case, it is best to aim to get as close to the target as possible.Try not to worry if you are failing to meet the target and work with your health team on ways you can get close to the target without becoming stressed or overly anxious.

Post pregnancy

Women with diabetes can return to their normal recommended HbA1c levels of 48 mmol/mol (6.5%) or under after the pregnancy.

Diagnosing gestational diabetes

HbA1c is not used for diagnosing gestational diabetes. Pregnant women without diabetes will be screened for possible gestational diabetes between weeks 8 and 12 of the pregnancy and an oral glucose tolerance test (OGTT) will be carried out between weeks 24 and 28.If you have had gestational diabetes during a previous pregnancy, you will be given an OGTT between 16 and 18 weeks and then at 28 weeks.

Quote of the Day

The best way to be missed when you are gone is to
stand for something when you are here …. Seth Godin, Author