NEWS



Ultraviolet radiation offers

New hope for cancer patients

Scientists from Japan have announced that they will soon have a new method of treating cancer that uses ultraviolet C (UV-C) light to destroy abnormal cells while leaving normal cells unharmed. Their findings, to be presented at the International Congress of Histochemistry and Cytochemistry in Kyoto next week, indicate that short bursts of UV-C radiation have the potential to harm neoplastic cells, the biological units that form tumours.

By irradiating these cells with high-intensity UV-C pulsed flash rays through a modified UV sterilisation system in the lab, researchers at the Tokai University School of Medicine were able to effect changes in the cells that led to their dysfunction and death within seconds. Non-neoplastic cells, however, were affected much less and survived the treatment, the scientists report. They now intend to develop their discovery into a cancer treatment method using a range of light irradiation equipment, including endoscopy and laser microscopy.

"This method offers a simple means of reducing the burden on patients undergoing cancer therapy," they commented.

Sensitivity of neoplastic cells to UV-C radiation has been also observed by other researchers. In a study, published in the Biochemical and Biophysical Research Communications journal in 2009, for example, scientists from the Gifu University Graduate School of Medicine in Japan reported the potential of low-dose UV-C combined with standard medication to inhibit the growth of pancreatic cancer cells. Similar effects were reported by the same research team regarding colon cancer cells.

Short-wavelength UV-C light does not occur naturally owing to the fact that it is completely reflected by the earth's ozone layer, but its germicidal effects have been proven and applied in medicine for sterilising equipment. In dentistry, among other things, UV-C is used in the sterilisation of toothbrushes and purification of air in dental offices. In contrast to the latest method investigated in Japan, however, these applications use low-intensity UV-C light emitted over a longer period.

Russian healthcare system

Improving but in need of investments

According to a new Espicom market research report, Understanding Russia's Regional Health Markets, the progress in improvement in Russia's health system is slow. Urban areas, particularly Moscow are of a high quality, but provision in rural areas remains poor.



Russia is the largest country in the world, with a land area of over 17 million square kilometres, encompassing eleven time zones. It has an estimated population of 142.9 million. Delivering universal high quality health services is a challenge.

Funding is at the heart of Russia's health improvement plans, and at the beginning of 2011 obligatory medical insurance contributions increased from 3.1 % to 5.1 %, deducible from salaries. This will raise an additional R460 billion (US$15.1 billion) over two years and will help cover the costs of overhauling, and equipping hospitals and polyclinics. The extra funds will also help to provide a wider range of free-of-charge medical services. With measures to increase income, however, has come the challenge of distribution and the recognition that, in common with countries such as India and China, there is a yawning gap between well provided for cities and the more remote regions.

In 2010, the government introduced the idea of a regional healthcare services modernisation scheme that aims to improve quality and availability of medical services and raise the profile of the medical profession. The decision to implement the required changes was difficult, particularly during a period of economic pressure. Healthcare modernisation is well overdue. To put this into context, over 30 % of hospitals lack a hot water supply, 8 % do not have a drinking water pipeline and 9 % lack drainage.

For further information on the report please visit www.espicom.com/rrmpr.

Tomorrow's dentures

Resemble Shark teeth

Researchers at the German University of Duisburg-Essen and the Max Planck Institute for Iron Research in Düsseldorf examined the teeth of two different sharks, the shortfin mako and the tiger shark, in terms of their structure, composition and mechanical properties. The teeth of both sharks were found to have a similar crystalline composition. According to the researchers, the interior of shark teeth contains dentine, a softer material also found in human teeth, while the enamel exterior is highly mineralised. Shark teeth contain fluorapatite, a very hard mineral, which could lead to the conclusion that they are harder than human teeth, which contain hydroxylapatite, a softer mineral, according to Dr Matthias Epple, Professor of Inorganic Chemistry at the university.

However, comparative analyses revealed that the hardness of shark teeth and human teeth was comparable, both for dentine and enamel. "This is mainly due



to the micro- and nano-structures of our teeth, in which crystals are highly ordered in a special topological orientation," said Epple. The scientists are now continuing their research on other shark species. They are hoping to recreate their dental structures for the production of dentures in the future. The study was published in the June issue of the Journal of Structural Biology.

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NEWS

Student wins US$2,000

For toothbrush sterilizer


[PICTURE: ©EVGENIY KARANDAEV]

A South African high school student has won first prize in the world's largest international pre-college science competition for a new toothbrush-sterilizing device.

Through a one-year project, she found four disease-causing pathogens on household toothbrushes, especially on those from houses in rural areas, and developed a promising method that destroys these bacteria and prevents cross-contamination.

Once when Chené Mostert from Ladysmith, KwaZulu-Natal, South Africa, was brushing her teeth she realized that bathroom layouts are hygiene disasters, as toilets are often situated in close proximity to the basin, where toothbrushes are generally stored. In collaboration with microbiologists at a commercial laboratory in Pretoria, South Africa, the 17-year-old tested 104 toothbrushes from urban and rural areas in South Africa and neighboring countries and established the presence of pathogens such as *Staphylococcus*, *Streptococcus, Candida* and *E. coli* on a number of brushes.

The student's aim was to develop a device to store toothbrushes that is simple in design and suitable for people in rural areas who do not necessarily have electricity. According to Mostert, the device consists of a box with four separate, perforated plastic tubes, into which the brushes can be placed to prevent cross-contamination.

By turning a handle, the user activates a rotating mechanism that rinses the bristles with hydrogen peroxide, which destroys any microorganisms present on the toothbrushes. "It's basic but effective," she said.

As the device is still in the process of being patented, Mostert was not allowed to provide any images of her sterilizing unit.

Surgeons perform

First in utero removal of oral tumor


[PICTURE: ©ORIGINALPUNKT]

For the first time in the history of fetal medicine, doctors have successfully removed a large oral tumor from the mouth of a four-month-old fetus in a pioneering in utero surgery. Last week, media representatives were invited to meet the child, who is now 20 months old, at a press conference.

As reported at the Jackson Memorial Hospital's press conference on June 21, a 37-year-old woman was diagnosed as having a fetus with a mass protruding from the fetal mouth, during a routine ultrasound in the twentieth week of her second pregnancy. According to the doctors, the findings were suggestive of an oral teratoma, a rare tumor that arises from all three embryonic germ layers.


[PICTURE: ©ERMOLAEV ALEXANDER]

After serious consideration, the procedure was carried out in May 2010 by Ruben Quintero, professor of obstetrics and gynecology, and Eftichia Konopoulus, assistant professor of obstetrics and gynecology, at the Jackson Memorial Hospital in Miami, Fla. Using an endoscope, guided by ultrasound, and a laser, the tumor was resected in utero without any maternal or fetal complications in a 68-minute operation under local anesthetic.

Five months after surgery, the patient went into spontaneous labor and delivered a healthy female infant without complication. The only sign of the surgery was a tiny scar on the baby's mouth, the doctors said.

According to the surgeons, nasopharyngeal teratomas are associated with an exceptionally high risk of neonatal mortality, particularly from airway obstruction. If done early enough, as in the present case, fetoscopic removal of the teratoma can avoid growth of the tumor mass, distortion of the facial structure, excess amniotic fluid, edema and the risk of a stillbirth, they said.

European Commission study

Ban of dental amalgam

A new study, conducted on behalf of the European Commission, recommends phasing out dental amalgam use over the next few years owing to mercury's negative impact on the environment.


[PICTURE: ©LUISSANTOS]

According to the recently published study results, the ban should be combined with improved enforcement of the EU waste legislation regarding dental amalgam.

The report explains that mercury-free alternatives are still not used widely in many EU member states. The reasons are that alternative fillings are often believed to be more expensive than amalgam fillings, that many dentists are simply not trained to apply new methods and that many dentists think that composite materials have a lower durability than amalgam fillings.

Some dentists are also "reluctant to change their current practice and invest in new equipment to handle mercury-free fillings," according to the report. Additionally, many patients are not even aware that amalgam fillings contain mercury.