Australian researchers transform teeth into early-stage brain cells
New findings could aid in the therapy of stroke victims

ADELAIDE, Australia/LONDON, UK: After almost a decade of research, the University of Adelaide’s Centre for Stem Cell Research has recently announced another breakthrough discovery in the use of dental stem cells for regenerative therapy. By exposing stem cells from mouse teeth to different growth factors present in the brain during early embryonic development, they were able to create complex networks of cells that resembled neurons, the cells in the brain that are responsible for transmitting and processing information.

While the cells are still missing features, such as ion channels, necessary to support the kind of communication that neurons conduct, they could be a major step in developing new therapies to help patients who have suffered a stroke, according to lead researcher Dr Kylie Ellis, a doctoral graduate in Physiology and Commercial Development Manager of the university’s commercial arm, Adelaide Research & Innovation. She said that other methods of induction using a different composition of factors may be necessary to support the full transition of the stem cells into neurons. Her team is now investigating the time window after a stroke in which these stem cells will be useful in helping aid recovery and how they may have this effect.

The neuronal-like appearance of a mouse-derived dental pulp stem cell. (DTU/Photos University of Adelaide, Australia)

DTI Asia Pacific

NextGen materials
Researchers at the Vienna University of Technology have reported to have developed a new generation of photovative materials based on the element germanium in partnership with dental manufacturer Ivoclar Vivadent. Initial tests have shown that it considerably reduces the duration of the hardening process for fillings.

Sterilisation ineffective
Using disposable rather than non-disposable syringe tips could potentially decrease the risk of cross-infection between dental procedures, even when the latter kind have been thoroughly sterilised several consecutive times, researchers from New Zealand have suggested in the latest issue of the Australian Dental Journal.

First 5-D dynamical virtual mouth
Scientists from Melbourne in Australia have recently presented the world’s first dynamic virtual mouth that includes 3-D representations of the anatomical features of teeth, gums, tongue, cheeks and palate. Using a technique called smoothed-particle hydrodynamics, it was developed on real data on the physics of chewing at the Commonwealth Scientific and Industrial Research Organisation, the Australian national science agency.

According to the researchers, the new mastication model will help to predict how a particular food breaks down and how flavour is released into the salivary system. In addition, it will show the distribution and interaction of components such as salt, sugar and fat, they said.

The invention holds important implications for getting a better understanding of food structures and the sensory experience of consumption as well as for other areas like oral health.

Sterilisation using disposable syringe tips could potentially decrease the risk of cross-infection between dental procedures, even when the latter kind have been thoroughly sterilised several consecutive times, researchers from New Zealand have suggested in the latest issue of the Australian Dental Journal.

A standard for dental records
The Niigata division of the Japan Dental Association is planning to standardise dental records nationwide to improve the identification of bodies in emergency situations such as large-scale disasters.

In order to increase identification efficiency, the association said it wants to implement an optical mark recognition sheet with 28 check items, including past treatment, that has shown to expedite the matching process of dental remains dramatically.

The initiative, which is part of a larger project by the Japanese Ministry of Health, Labour and Welfare, was successfully tested last year with dental information gathered from over 1,700 patients from the Niigata prefecture.

NextGen materials
Researchers at the Vienna University of Technology have reported to have developed a new generation of photovative materials based on the element germanium in partnership with dental manufacturer Ivoclar Vivadent. Initial tests have shown that it considerably reduces the duration of the hardening process for fillings.
Sinus grafting procedures are an established therapy to gain bone height in the posterior maxilla. Depending on the remaining bone height, they can be performed with simultaneous or two-stage implant placement using osteotomes, a trans-alveolar or lateral-window approach. Numerous studies have shown predictable results using autogenous bone but also bone substitute materials. However, within the last decade, the role of autogenous bone as the “golden standard” for sinus grafting procedures has been increasingly discussed, since same results can be obtained using bone substitute materials without additional donor-site morbidity and additional stress for the patient.

In the webinar, different approaches of sinus grafting procedures, the selection of different bone substitute materials, clinical and histological results and a sufficient complication management will be discussed.
Dental curriculum in Bangladesh revamped

DHAKA, Bangladesh: Students planning to take up an education in dentistry in Bangladesh this year will have to study longer, as the country’s Medical and Dental Council in the capital Dhaka has approved a new curriculum at its general meeting, which was held in early May. Among other things, it will see Bachelor of Dental Surgeon (BDS) programmes extended to five years.

Timelines for the annual examinations will also be changed in order to give students more time to focus on practical learning when the new guidelines will become effective later this year.

The previous dental curriculum, implemented in 2007, required BDS students to study for four years which, according to representatives of the Bangladesh Dental Society, proved insufficient for remaining competitive with students from other countries where students often have to complete longer programmes.

Similar rules were already implemented successfully with new guidelines for academic degrees in medicine and general surgery last year, they told the newspaper Dhaka Tribune last week.

The update for dental programmes will become valid for students who enroll for the next academic year 2014–2015 starting in fall. All graduates who have started under the previous curriculum will not be affected by the changes, the Council said. Bangladesh has currently 1,700 seats available in 23 dental colleges nationwide, of which over 90 per cent are operating privately, according to figures from the Directorate General of Health Services, an agency working under the country’s Ministry of Health and Family Welfare.

“Should our results continue to be as successful as they have been, we hope to see this work entering clinical trials within the next five years,” she told Dental Tribune Asia Pacific.

The centre, a collaboration of academic and medical institutions at the university, has been working on brain therapies based on dental stem cells since 2005. Among other findings, it has discovered that treatment with stem cells after a stroke can lead to improved cognitive and motor skills in rodents. The recent findings published in the Stem Cell Research and Therapy journal were part of wider research on developing a laboratory-based model for actual treatment in humans.

“Ultimately, we want to be able to use a patient’s own stem cells for tailor-made brain therapy that doesn’t have the host rejection issues commonly associated with cell-based therapies,” Ellis said. “Dental pulp stem cell therapy may also provide a treatment option available months or even years after the stroke has occurred.”

According to research, dental stem cells derived from the pulp of primary or adult teeth hold great potential for future regenerative therapies. For example, they have been successfully transformed into a variety of tissues, including blood, bone and nerves, by researchers. In comparison with stem cells extracted from bone marrow and other sources, they are easier to collect and pose fewer ethical problems.