

## Novel path breaking vistas in dentistry

In the recent times, several important events took place in the realm of the dental literature. Science has provided an excuse for those of us who used to cite upon the oral health professionals for not brushing often enough, blame on your cavities on the industrial revolution.

New research suggests that the dietary changes associated with the industrial revolution 150 years ago caused an epidemic of tooth decay and gum diseases - the culprits being the oral bacteria! The human mouth is native home of a wide array of microbes, some being helpful and some harmful. Over the itinerary of human history, eating more starch and sugary substances seems to have tipped the balance in favor of the disease-causing bacteria. Even without ultrasonic brushes and mouthwashes our ancestors may have had healthier teeth than us.

To study the ancient microbial communities inhabiting human mouths, an international team of researchers capitalized on the fact that oral bacteria are trapped on the teeth upon a tartar buildup. The scientist collected tartar samples from the teeth of human skeletons ranging from a few hundred to >6000 years old and extracted the bacterial DNA providing snapshots of the oral ecosystem at different junctures in our history.<sup>[1]</sup> Analysis of the DNA showed two things - the first being that the different bacterial species became more common after dietary shifts, and second being the fact that as the dietary changes occurred, the diversity of the oral ecosystem plummeted. As with many other habitat on earth, there just aren't as many species living in our mouths as there used to be. Since greater biodiversity is associated with healthy resilient ecosystem, a lack in the same results in high rates of dental diseases among modern humans.

Another new study has reported that the red wine, as well as grape seed extract, could potentially help to prevent the dental decay. Development of natural products that ward off dental diseases with fewer side effects, as reported in the journal of agriculture<sup>[2]</sup> also suggested that polyphenols, grape seed extract and wine can slow bacterial growth, so Research team decided to test them under realistic conditions. They grew cultures of bacteria responsible for dental diseases as



a biofilm and dipped the biofilms for a couple of minutes in different liquids, including red wine, red wine without the alcohol, red wine spiked with grape seed extract, and water and 12% ethanol for comparison. Red wine with or without alcohol and wine with grape seed extract were the most effective at getting rid of the bacteria which causes decay.<sup>[3]</sup>

In another achievement, the researchers of the University of Adelaide have discovered that stem cells taken from teeth can grow to resemble brain cells, suggesting that they could 1-day be used in the brain as a therapy to treat stroke. In the University's Center for Stem Cell Research, laboratory studies have shown that stem cells from teeth can develop and form complex networks of brain-like cells.<sup>[4]</sup> Although these cells haven't developed into fully fledged neurons, researchers believe it's just a matter of time and the right conditions for it to happen.

Ultimately, the main aim is to use patient's own stem cells for tailor-made brain therapy that doesn't have the host rejection issues commonly associated with cell-based therapies. Another advantage is that the dental pulp stem cell therapy may provide a treatment option available, months or even years after a stroke has occurred. This work with dental pulp stem cells opens up the potential for exploring many more common brain disorders in the laboratory, which could help in developing new treatments and techniques for patients.

In another interesting achievement, Harvard-led team is the first to demonstrate the ability to use the low-power light to trigger stem cells inside the body to regenerate tissue, an advancement they reported in Science Translational Medicine.

The research, led by Wyss Institute lays the foundation for a host of clinical applications in restorative dentistry and regenerative medicine more broadly, such as wound healing, bone regeneration, and more. The team used a low-power laser to trigger human dental stem cells to form dentin, the hard tissue that is similar to bone and makes up the bulk of teeth. What's more, they outlined the precise molecular

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mechanism involved, and demonstrated its prowess using multiple laboratory and animal models.<sup>[5]</sup>

A number of biologically active molecules, such as regulatory proteins called growth factors, can trigger stem cells to differentiate into different cell types. Current regeneration efforts require scientists to isolate stem cells from the body, manipulate them in a laboratory, and return them to the body – efforts that face a host of regulatory and technical hurdles to their clinical translation. However, Wyss Institute approach is different, and they hope that it can be easily manipulated in the hands of the learned clinicians.

Another breakthrough is the applicability of medical laser that was used in the late 1960s. Doctors have been accumulating anecdotal evidence that low-level light therapy can stimulate all kind of biological processes including rejuvenating skin and stimulating hair growth, among others. However, interestingly enough, the same laser can also be used to ablate the skin and remove the hair – depending upon the way the clinician uses the laser. The clinical effects of low-power lasers have been subtle and largely inconsistent. This new work marks the pioneer efforts of the scientists and how they have gotten to the nub of low-level laser treatments work on a molecular level, and lays the foundation for controlled treatment protocols.

Thus to conclude, there has been an extraordinary explosion in the medical/dental research and the dedicated workers in the health service should see that it should benefit the patients in particular and society as a whole.



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