

Ditchburn, Jae-Llane ORCID: <https://orcid.org/0000-0002-7499-6790> (2019)
'Filling' anxious at the dentist's cell: regrowth for a new smile. University of
Cumbria blog [online] . (Unpublished)

Downloaded from: <http://insight.cumbria.ac.uk/id/eprint/4843/>

Usage of any items from the University of Cumbria's institutional repository 'Insight' must conform to the following fair usage guidelines.

Any item and its associated metadata held in the University of Cumbria's institutional repository Insight (unless stated otherwise on the metadata record) may be copied, displayed or performed, and stored in line with the JISC fair dealing guidelines (available [here](#)) for educational and not-for-profit activities

provided that

- the authors, title and full bibliographic details of the item are cited clearly when any part of the work is referred to verbally or in the written form
 - a hyperlink/URL to the original Insight record of that item is included in any citations of the work
- the content is not changed in any way
- all files required for usage of the item are kept together with the main item file.

You may not

- sell any part of an item
- refer to any part of an item without citation
- amend any item or contextualise it in a way that will impugn the creator's reputation
- remove or alter the copyright statement on an item.

The full policy can be found [here](#).

Alternatively contact the University of Cumbria Repository Editor by emailing insight@cumbria.ac.uk.



3 Jun, 2019

'FILLING' ANXIOUS AT THE DENTIST'S CELL REGROWTH FOR A NEW SMILE

by Jae-LLane Ditchburn

Some people are afraid to visit the dentist 1. For them, visits to the dentist are associated with feelings of anxiety of having to open their mouths for a relative stranger to examine and worse, use what looks like a sharp instrument to drill holes into their teeth.



People who experience dental anxiety² also tend to skip attending their dental appointments, delay in seeking treatment or simply avoid it altogether³. Fear associated with dental treatment is ranked as both the fifth most common and fifth most intense fear and phobia in the general population^{4,5}.

Increased dental anxiety associated with stimuli or physical sensations has been reported in people undergoing dental procedures such as “feeling the drill in the mouth”⁶. A higher number of decayed tooth surfaces, tooth decay and missing teeth along with a lower number of tooth fillings or functional teeth are more commonly seen in people with high dental fear compared to those with low dental fear. Interestingly, a study found no differences in caries prevalence between these groups of high and lower dental fear⁷. This suggests that we are all at risk of dental caries that can occur in tooth enamel, dentin, surface, and pit and fissures⁸. Perceived levels of dental anxiety also vary with different dental treatments, for instance, tooth extraction has perceived to be the most fearful⁹ yet the occurrence of dental anxiety in patients persists regardless of whether they have had previous experience in endodontic treatment or previous experience in pain in the treated tooth¹⁰. This brings us to the question of having good teeth. What if our

teeth and gums are always healthy to enable every dental visit to become pleasant and “drill”-free?

What can we do to have good dental health?

Maintaining good oral care and hygiene will help to keep our teeth and gums as healthy as possible and avoid tooth decay. Avoiding sugary and starchy food and drinks will help prevent tooth decay. Regular brushing with a fluoride toothpaste or using floss and an interdental brush at least once a day also helps. Adopting a healthier lifestyle such as not smoking or avoiding excessive alcohol consumption may prevent further tooth caries. Community water fluoridation is also effective in reducing tooth decay 11,12.

Risk of tooth loss in our lifetime



While dental caries and periodontal disease are two major causes for poor oral health, tooth loss often occurs because of injury or disease, rather than because of ageing. For example, inflammation from periodontitis can cause soft tissue pockets or crevices between the gums and the tooth root. Following this, loosening of teeth may occur with occasional pain, problems with chewing, and eventually lead to tooth loss. In addition, tooth enamel can also chip and crack. If this happens, its function to insulate our teeth from chemicals or changes in temperature will be impaired.

Growing back our teeth



The idea of cell regeneration of human teeth is an exciting one. Sharks' teeth appear in rows similar to a harvesting machine with many rows of blades. In fact, sharks have multiple rows of teeth inside their jaw which constantly regrow so that a corresponding tooth in a row behind one

that has dropped out will move forward to replace it. What is amazing is that the gums of the shark support and carry each tooth just like a conveyor belt.

In studying a small species of shark known as the catshark (*Scyliorhinus canicula*), researchers found special compartments of stem cells within the epithelial cells that line the sharks' mouths. These stem cells that generate from within the compartments enable continuous tooth regrowth in the catshark 14. Similar functions of regrowth are also reported in renal stem cells in sharks where existing stem cells are induced to form new glomeruli when there is a loss of renal tissue 15. What is unique about stem cells is their ability to multiply and transform into cells which serve different functions in the body. There is a huge potential for stem cells to be used in regenerative medicine or living cell therapies.

Promoting stem cells to regrow teeth

Low power light (LPL) treatment, otherwise known as laser treatment or low-level laser therapy is not new 16,17. Laser treatment has been used to reduce pain and inflammation 18 and to promote wound healing 19,20. Researchers in Korea used a lower power laser to see if this would stimulate the growth of human dental stem cells to form dentin 21. To do this, human dental stem cells were given laser treatment at various pulses. After 21 days, results showed that there was indeed the growth of dentin from the human dental stem cells. The researchers found that the laser treatment had stimulated cellular activity associated with oxygen-reactive species and mitochondrias, which in turn triggered a transforming growth factor that signalled the human dental stem cells to form dentin. This shows that laser treatment can help to promote repair or healing by

stimulating cellular pathways in stem cells. Being able to grow new dentin is definitely a good idea.

After their successful trial using two animal models, scientists in China conducted a clinical trial on implanting human deciduous pulp stem cells into the injured teeth of dental patients 22. After twelve months, they found that pulp tissue equipped with blood vessels and sensory nerves had indeed regenerated. Furthermore, there were increases in the length of the root and reduction at the apical foramen, the point at which where the nerve and blood vessels enter the root of a tooth. This research is encouraging because it shows that implanting tooth stem cells may help in the recovery of injured teeth.

The best thing indeed, is to have the ability to grow new teeth. Although treatment for growing new teeth is not available yet, research in this area is continuous and expanding. So meanwhile, before this happens, we should look after our teeth. Once we are adults, we only possess one set of teeth which should be kept healthy so that we can maintain a good quality of life.

**View our science courses
(/study/academic-
departments/science-natural-
resources-and-outdoor-
studies/science/)**

References:

1. Beaton, L., Freeman, R. & Humphris, G. Why are people afraid of the dentist? Observations and explanations. *Med. Princ. Pract. Int. J. Kuwait Univ. Health Sci. Cent.* 23, 295–301 (2014).

2. Coriat, I., H. Dental anxiety: fear of going to the dentist. *Psychoanal. Rev.* 33, 365–367 (1946).
3. Hill, K., Chadwick, B., Freeman, R., O'Sullivan, I. & Murray, J. Adult Dental Health Survey 2009: relationships between dental attendance patterns, oral health behaviour and the current barriers to dental care. *Br. Dent. J.* 214, 25 (2013).
4. Agras, S., Sylvester, D. & Oliveau, D. The epidemiology of common fears and phobia. *Compr. Psychiatry* 10, 151–156 (1969).
5. Carter, A. E., Carter, G., Boschen, M., AlShwaimi, E. & George, R. Pathways of fear and anxiety in dentistry: A review. *World J. Clin. Cases* 2, 642–653 (2014).
6. Holtzman, J. M., Berg, R. G., Mann, J. & Berkey, D. B. The relationship of age and gender to fear and anxiety in response to dental care. *Spec. Care Dentist.* 17, 82–87 (1997).
7. Schuller, A. A., Willumsen, T. & Holst, D. Are there differences in oral health and oral health behaviour between individuals with high and low dental fear? *Community Dent. Oral Epidemiol.* 31, 116–121 (2003).
8. Selwitz, R. H., Ismail, A. I. & Pitts, N. B. Dental caries. *The Lancet* 369, 51–59 (2007).
9. Stabholz, A. & Peretz, B. Dental anxiety among patients prior to different dental treatments. *Int. Dent. J.* 49, 90–94 (1999).
10. Peretz, B. & Moshonov, J. Dental anxiety among patients undergoing endodontic treatment. *J. Endod.* 24, 435–437 (1998).
11. Lo, C. The Fluoride in Schoolchildren Study [FLOSS]. (2019).

12. Zohoori, F. V. & Duckworth, R. M. Fluoride: Intake and Metabolism, Therapeutic and Toxicological Consequences. in *Molecular, Genetic, and Nutritional Aspects of Major and Trace Minerals* 539–550 (Elsevier, 2017).
13. Pihlstrom, B. L., Michalowicz, B. S. & Johnson, N. W. Periodontal diseases. *The Lancet* 366, 1809–1820 (2005).
14. Smith, M. M., Fraser, G. J. & Mitsiadis, T. A. Dental lamina as source of odontogenic stem cells: evolutionary origins and developmental control of tooth generation in gnathostomes. *J. Exp. Zool. B Mol. Dev. Evol.* 312, 260–280 (2009).
15. Haller, H., De Groot, K., Bahlmann, F., Elger, M. & Fliser, D. Stem cells and progenitor cells in renal disease. *Kidney Int.* 68, 1932–1936 (2005).
16. Moshkovska, T. & Mayberry, J. It is time to test low-level laser therapy in Great Britain. *Postgrad. Med. J.* 81, 436–441 (2005).
17. Cotler, H. B., Chow, R. T., Hamblin, M. R. & Carroll, J. The Use of Low-Level Laser Therapy (LLLT) For Musculoskeletal Pain. *MOJ Orthop. Rheumatol.* 2, 00068 (2015).
18. Bjordal, J. M., Couppé, C., Chow, R. T., Tunér, J. & Ljunggren, E. A. A systematic review of low-level laser therapy with location-specific doses for pain from chronic joint disorders. *Aust. J. Physiother.* 49, 107–116 (2003).
19. Tumilty, S. et al. Low-level laser treatment of tendinopathy: a systematic review with meta-analysis. *Photomed. Laser Surg.* 28, 3–16 (2010).
20. Bakhtiar, H. et al. The role of stem cell therapy in regeneration of dentine-pulp complex: a systematic

review. *Prog. Biomater.* 7, 249–268 (2018).

21. Kim, H. B. et al. Effects of pulsing of light on the dentinogenesis of dental pulp stem cells in vitro. *Sci. Rep.* 8, 2057 (2018).
22. Xuan, K. et al. Deciduous autologous tooth stem cells regenerate dental pulp after implantation into injured teeth. *Sci. Transl. Med.* 10, eaaf3227 (2018).

I want to know more...

Sign-up to receive our latest science blogs.

First name *

Surname *

Email *



YOU MIGHT ALSO LIKE...

Do microbes matter in climate change?

Microbes are single-celled organisms such as bacteria, protozoa and unicellular algae. They can be found in all sorts of environments. To date, the vast majority of microbes is still unknown.

[\(/blog/articles/do-microbes-matter-in-climate-change.php\)](/blog/articles/do-microbes-matter-in-climate-change.php)

Nursing at Cumbria University

At the university of Cumbria, our three year Pre-registration Nursing Programme offers student nurses the opportunity to learn from all four fields of nursing; Adult, Child, Mental Health and Learning Disability.

[\(/blog/articles/nursing-at-cumbria-university.php\)](/blog/articles/nursing-at-cumbria-university.php)

Meet the Institute of Education Lecturers

Find out who will be teaching you on the Education degrees, how they got to where they are today and what advice they would give to their younger self.

[\(/blog/articles/meet-the-institute-of-education-lecturers.php\)](/blog/articles/meet-the-institute-of-education-lecturers.php)