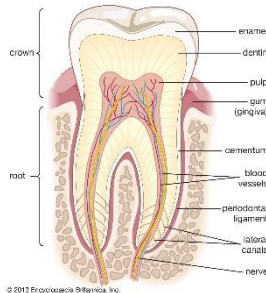


## Patient-specific tools evaluating teeth decay: are we biting off more than we can chew?

The enamel on the teeth is the hardest and most highly mineralised substance in the body. It covers the outer layer of each tooth and it is the most visible part of the tooth. Enamel plays a very important role in protecting your teeth from decay. It forms a strong barrier that protects the inner layers of your teeth from the effects of acids and plaque. Enamel also insulates the teeth from potentially painful temperatures and chemicals. Unlike a broken bone that can be repaired by the body, once a tooth chips or breaks, the damage is done forever. It is thus extremely important to monitor the state of enamel. Dental enamel is a complex and highly anisotropic material with heterogeneous micro-structure. With years of use dental enamel experiences various types of loading, from impact-type to fatigue-type loading.



In this project we will model the behaviour of dental enamel with respect to its strength, toughness and wear, and thus predict its response due to applied loading in different real life scenarios, bearing in mind patient specific particularities (e.g., existing micro-cracks and micro-imperfections, level of wear).

In order to monitor the state of wear of dental enamel, a recently developed experimental technique, for the measurement of enamel thickness in teeth based on ultrasound resonance method, can be used. The experimental results can allow to accurately design the geometry, in particular the thickness of enamel layer, and potentially act as a validation of the numerical models.

The main aim of this project is, through a numerical approach, to develop patient-specific models which take into account the particular microstructure of the dental enamel, level of wear, allowing us to access the current state of teeth in order to potentially recommend possible dental treatment to improve the current conditions, and thus eventually, improve the quality of patient's life.

Contact: Inna Gitman [i.m.gitman@utwente.nl](mailto:i.m.gitman@utwente.nl) (N205)