

## Sectioning Teeth with the ROWIAK TissueSurgeon

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### Introduction

Sectioning teeth for histology is challenging. As decalcification is not an option (enamel will be totally lost) the conventional method of choice is the preparation of ground sections. This method has certain disadvantages: The method is very laborious and serial sections are not possible as at least 500  $\mu\text{m}$  get lost by grinding. Also minimum section thickness is limited to 30  $\mu\text{m}$  (with very good equipment). The ROWIAK TissueSurgeon offers a new approach to cut thinner sections of teeth without decalcification and the work of ground sections. The loss of material of each section is limited to 10  $\mu\text{m}$ .

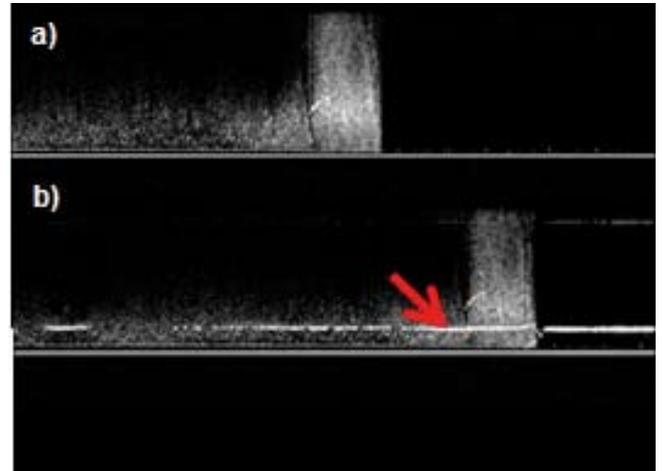
### Material and Methods

Human dried teeth were embedded into Methyl-Methacrylate. Embedding is necessary if serial sections of the whole tooth are desired. Especially lateral parts of the tooth need to be stabilized for handling.

After embedding, teeth were cut with the TissueSurgeon in an bucco-lingual axis and the cut surface was polished. This surface was mounted on a microscope slide with Körapox 439.

Sections of 20  $\mu\text{m}$  thickness were prepared with the ROWIAK TissueSurgeon. Success of sectioning was controlled via OCT-imaging (Fig. 1).

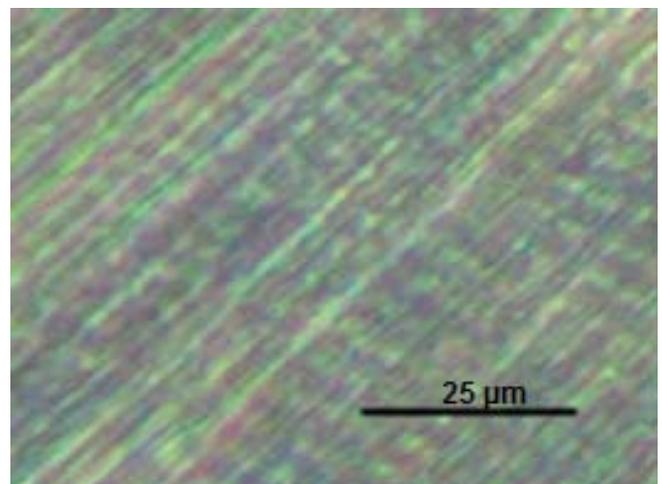
After sectioning, the surface of the section on the microscope slide was polished with fine grinding paper (4000er graining, Struers) and cover slipped afterwards. Samples were imaged with Zeiss Primostar in phase contrast mode with blue filter.



**Fig. 1:** OCT of dental hard tissue a) before and b) after cut. White line (arrow) indicates successful section



**Fig. 2:** Histology of the enamel dentin-junction (20  $\mu\text{m}$ )



**Fig. 3:** Detail of enamel. Note the Striae of Retzius and the prism structure (20  $\mu\text{m}$ )

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### Results

Sections of teeth can easily be prepared with the ROWIAK TissueSurgeon. Success is monitored via integrated OCT (Fig. 1). The number of sections per tooth is almost serial section like (10 µm loss of material per section compared to at least 500 µm in ground sections).

The final sections show microstructures and increments comparable to those in well prepared, even ground sections:

The enamel-dentin-junction is clearly visible, displayed slight above the enamel-cementum-junction (Fig. 2). A detail of the enamel shows Striae of Retzius and cross striations of the enamel prisms (Fig 3). In the dentin, the tubules of the odontoblastic processes can be seen (Fig. 4) as well as interglobular dentin (Fig. 5). The layered structure of the cementum, which can be used for annulation is best seen in sections thinner than 20 µm (Fig.6). Overlay effects like in ground sections are no problem anymore.

### Conclusion

The ROWIAK TissueSurgeon offers new solutions in cutting teeth for histology: It is possible to prepare almost serial sections in equal quality compared to ground sections (only 10 µm loss of material compared to 500 µm). Also sections can be prepared thinner (down to 10 µm) if desired. Throughput of samples can be increased significantly as time consuming ground section technology is not necessary anymore.

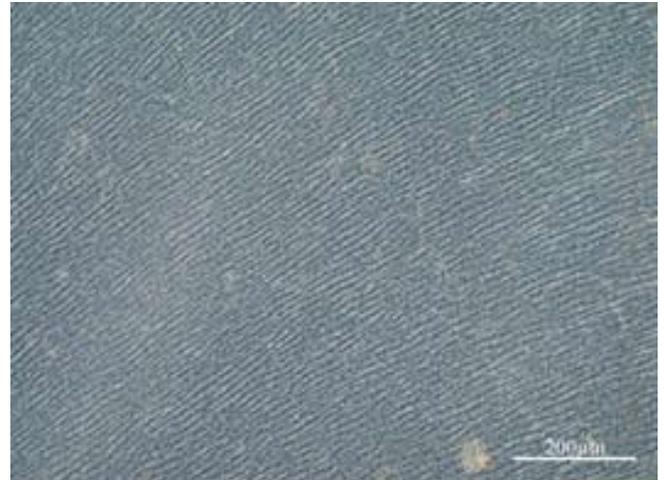


Fig. 4: Detail of dentin, note the odontoblastic processes (20µm)



Fig. 5: Detail of dentine at the cementum junction. Note the Interglobular dentin (20 µm)



Fig. 6: Detail of cementum. Note the layered structure of the cementum (15 µm)