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Improving oral cancer surgery by intra-operative assessment of resection margins: need for objective techniques

Patients with oral cavity cancer are often treated with surgery. **Of the many factors that may affect the clinical outcome of patients with OCSCC** (such as tumor site, TNM classification, patient age, comorbidity) **only the resection margin is under the control of the surgeon and the pathologist**. The goal is to remove the tumor with a margin of > 5 mm of surrounding healthy tissue, according to the international guideline of Royal College of Pathologists. This results in the best patient outcome through highest 5-year survival, less need for adjuvant radiotherapy/chemotherapy, better quality of life, less tumour recurrence. This is referred to as “adequate surgery”. However, in the oral cavity region many important and delicate functional tissue structures should be spared if possible. Moreover, it is often impossible for the surgeon to accurately delineate the tumour in the operating room by visual inspection and palpation alone. Unfortunately, as a result only about 15% to 26% of the oral cancer surgeries achieve adequate resection margins. **Intraoperative assessment of tumor resection margins can dramatically improve surgical results**. It enables the surgico-pathological team to directly perform additional tissue resection, if necessary, to achieve a so-called “**first time right surgery**”. However, current methods are laborious, subjective, and logistically demanding. This hinders broad adoption of intraoperative assessment of tumor resection margins, to the detriment of patients. Inadequate resection margins result in the need for a 2nd, sometimes 3rd operation, combined or not with chemotherapy or radiotherapy. **Therefore, an objective easy-to-use technique is needed**, to accurately assess all resection margins intraoperatively. The challenges in pathology and the opportunities of photonic techniques in general will be discussed. The development of a high-wavenumber Raman spectroscopic technology, for quick and objective intraoperative measurement of resection margins will be presented.

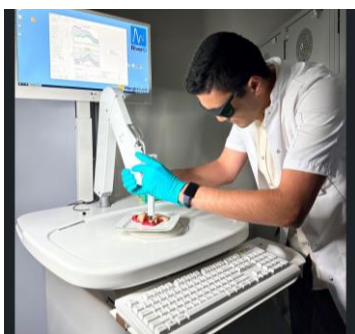


Figure 1: Raman spectroscopy-based intra-operative assessment of resection margins during oral cancer surgery