
Registration Seminar

Seminar Title	: Efficient low-cost AI-enabled oral cancer screening device using multimodal label-free optical imaging and spectroscopy
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Venue	: BM Departmental Seminar Room BM-140
Date and Time	: 19 May 2025 (11:00 AM)
Abstract	: Oral cancer, primarily oral squamous cell carcinoma (OSCC), remains a pressing global health issue, particularly in regions with prevalent risk behaviors such as tobacco and betel quid use. Early detection is critical, as late-stage diagnosis is often associated with poor prognosis and diminished quality of life. Oral potentially malignant disorders (OPMDs) present an opportunity for early intervention but are frequently underdiagnosed due to asymptomatic or benign-like presentations. Our work critically evaluates current and emerging screening and diagnostic tools aimed at improving the early detection of oral cancer and OPMDs. Traditional methods, including white light visual inspection and palpation, remain foundational but are limited by subjectivity and variable diagnostic accuracy. Adjunctive aids such as vital staining with toluidine blue and Lugol's iodine improve lesion visibility. Non-invasive biomarker-based approaches using saliva and serum hold promise for repeated screening and molecular-level detection. Optical modalities, including autofluorescence imaging, Raman and reflectance spectroscopy, and narrow-band imaging, enhance lesion characterization through biochemical and structural insights. Advanced imaging tools—optical coherence tomography (OCT), ultrasound, CT, MRI, and PET—are crucial for staging and treatment planning. The integration of artificial intelligence (AI) offers transformative potential in automating image and data analysis, improving diagnostic consistency, and expanding access in low-resource settings. By exploring the strengths, limitations, and integration potential of these technologies, we will design an AI-enabled multimodal screening device to screen oral cancer in resource-limited settings.

Keywords

Oral cancer, diagnostic tools, oral potentially malignant disorders, artificial intelligence, early detection