A-404 - 3D analysis and visualization of skin tumor vasculature using Line-field confocal optical coherence tomography [Abstract]

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A-394
Malignant Melanoma of the Tongue: A Systematic Review

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Background: Malignant melanoma of the tongue is an exceptionally rare and aggressive neoplasm, accounting for less than 2% of oral melanomas [1,2]. Its rarity and atypical presentation make diagnosis and management challenging. This systematic review aims to consolidate available evidence on the epidemiology, clinical characteristics, histopathological features, treatment strategies, and outcomes of tongue melanoma.

Methods: A comprehensive literature search was conducted up to November 2024. Data were extracted on demographics, lesion characteristics, histopathology, treatment modalities, and outcomes.

Results: Forty-seven cases of tongue melanoma were included. The male-to-female ratio among the included cases was 1.38:1. The mean age at diagnosis was 58.6 years, with a median of 62 years and a range of 7 to 90 years. Anatomically, 94.59% of lesions were on the body of the tongue. Lesion sizes varied widely, with a median diameter of 2.69 cm; 51.6% were larger than 3 cm. Histopathological findings were available for 23 cases, with spindle cell morphology observed in 34.78%, epithelioid in 13.04%, and mixed morphologies in another 34.78%. Common immunohistochemical markers included HMB45 (76.47%) and S100 (64.71%). Metastases were present in 38.46% of cases at diagnosis, primarily affecting the lungs and pleura. Nodal metastases were observed in 35.9% of cases, while 20.51% experienced local recurrence. Local invasion was reported in 12.82%, and treatment outcomes showed poor prognosis, with 38.46% of patients succumbing to the disease. Treatment approaches included wide local excision in most cases, sometimes combined with neck dissection, chemotherapy, or radiation therapy. Other therapies included immunotherapy (e.g., anti-PD-1/PD-L1) and interferon alfa-2b.

Conclusions: Tongue melanoma is a rare but aggressive malignancy with significant diagnostic and therapeutic challenges. Early detection and a multidisciplinary approach are crucial. Despite its rarity, understanding its diverse clinical presentations, histopathological features, and aggressive behaviour is essential for timely diagnosis and effective management. Given the limited evidence base, collaborative efforts among clinicians, pathologists, and oncologists are vital to advancing diagnostic and therapeutic approaches. Future research focusing on larger case series, genetic pathways, and novel therapies is needed to bridge current knowledge gaps and improve outcomes for this rare and aggressive malignancy.

Keywords: tongue melanoma; mucosal melanoma; oral neoplasms; malignant melanoma; systematic review

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A-401
Development of a molecular assay for multiomic detection of cfDNA signals in blood samples from skin cancer patients

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Background: Skin cancer is one of the most common forms of cancer, and it is projected to become a significant public health problem in Europe.Basal-cell skin cancer (BCC) and squamous-cell skin cance (SCC) rarely result in death, whilst the survival rate of melanoma is highly dependent on the stage.This means that the early detection of skin cancer, especially melanoma is of paramount importance.The objective of this study is to develop a comprehensive multi-omic blood-based test for early detection of skin cancer based on the Oxford Nanopore Technology.

Methods: DNA libraries were prepared by end-repair and A-tailing following the manufacturer's instructions.Standard native ONT barcodes were ligated in extended ligation steps to improve the ligation yield.After ligation, the samples were pooled, magnetic bead-cleaned up, and underwent ONT adaptor addition through multiplexing with another round of end-repair and A-tailing.Then we employed the standard ONT protocol to prepare the libraries in a sequencing reaction on a MinION sequencer with an R10.4.1 flow cell. We employed the newly developed epi2me labs software suite, more precisely the consolidated wf-human-variation workflow to carry out calling of single nucleotide variants (SNVs) with the Clair3 caller, structural variants (SVs) with the Sniffles 2 caller, copy number variants (CNVs) with the Spectre caller, modified base calling (DNA methylation and hydroxymethylation) with the modkit caller

Results: We developed highly efficient ligation-dependent library generation protocols via thorough end-repair, and efficient barcoding/adaptor annexation. Blood samples were collected from 16 individuals (n = 16) with basal cell carcinoma, melanoma, dysplastic nevi, and actinic keratosis. Cell-free DNA with total yields ranging from 5-80 ng was extracted from all samples with the MagMax cfDNA kit. Upon quality control of obtained sequences in terms of their coverage and distribution, we proceeded with the analysis of eleven samples, melanoma n = 2, basal cell carcinoma n = 4, and non-cancer controls n = 5.

Comparative analysis of DNA methylation revealed unique patterns associated with different types of skin cancer

Conclusions: We developed a cost-effective and sensitive multidimensional cfDNA assay by leveraging the Oxford Nanopore Technology platform.We will apply our new method to generate data and train a machine-learning classifier to distinguish skin cancer from non-cancer and detect the subtype of skin cancer

Keywords: skin cancer, melanoma, cfDNA, DNA methylation, machine-learning classifier

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A-404
3D analysis and visualization of skin tumor vasculature using Line-field confocal optical coherence tomography

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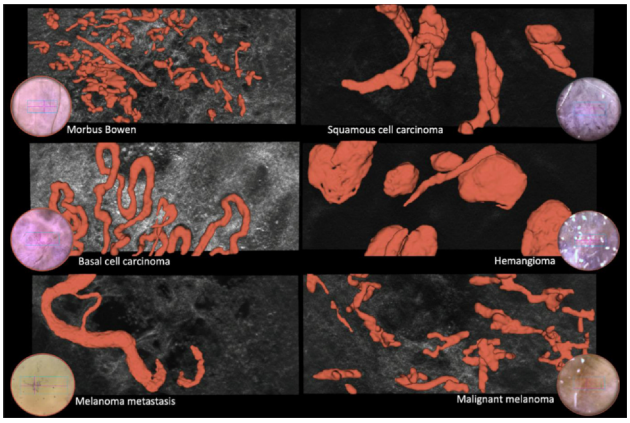
Background: Line-Field Confocal Optical Coherence Tomography (LC-OCT) is an emerging imaging modality that enables high-resolution, three-dimensional (3D) visualization of skin vasculature. This technology has shown great potential in analyzing the complex

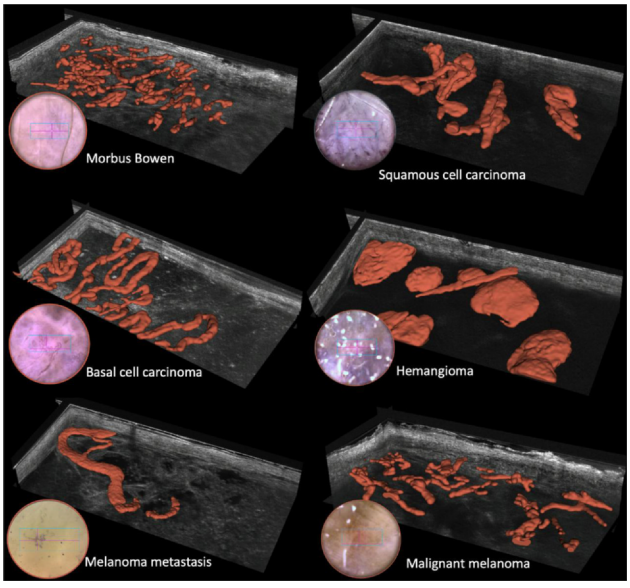
vascular structures within skin tumors, contributing to a deeper understanding of tumor angiogenesis and associated vascular abnormalities.[1] Tumor angiogenesis, driven by factors such as VEGF under hypoxia, plays a pivotal role in tumor growth, metastasis, and therapeutic resistance.[2] Despite advances in vascular imaging, limitations in detecting and reconstructing irregular tumor vessels present ongoing challenges.

Methods: This study employs a systematic approach for reconstructing and visualizing vascular structures from LC-OCT image stacks. Original images are converted to negative formats, vessels are manually traced using the Simple Neurite Tracer (SNT) plugin, and smoothed binary masks are generated to create 3D models. These reconstructions enable detailed analyses of vascular morphology, spatial organization, and blood flow dynamics. Furthermore, the methodology aligns with advancements in automated segmentation using machine learning, which improves efficiency and accuracy in analyzing complex vascular networks.

Results: The study successfully demonstrates the ability of LC-OCT to visualize serpiginous, corkscrew-like, and irregular vascular structures in melanoma, squamous cell carcinoma, and basal cell carcinoma. The 3D reconstructions provide insights into the spatial arrangements and functional characteristics of tumor vessels, revealing details previously undetectable with two-dimensional imaging methods. The results underscore the structural abnormalities and leaky nature of tumor vasculature, highlighting their role in inefficient blood supply, tumor growth, and metastasis.



Different skin tumor vessels in 2D



Different skin tumor vessels in 3D

Conclusions: LC-OCT is a powerful tool for advancing the understanding of vascular biology in skin tumors. Its ability to generate 3D reconstructions of vascular networks offers significant advantages in diagnosing skin cancer, monitoring therapeutic responses, and studying vascular development. This method enhances clinical and research capabilities by providing detailed visualizations of vascular polymorphism and pathology. As imaging technologies continue to evolve, LC-OCT stands out as a valuable technique for improving patient outcomes and contributing to the broader field of dermatology and oncology.

References:

[1] Mayer Oliver, Wirsching Hanna, Schlingmann Sophia, Welzel Julia, Schuh Sandra, (2024), 3D segmentation and visualization of skin vasculature using Line-field confocal optical coherence tomography, Appl Sci, 159, 151, https://www.mdpi.com/2076-3417/15/1/159

[2] Folkman Judah, (1971), Tumor angiogenesis: Therapeutic implications, N Engl J Med, 1182–1186, 285, https://www.nejm.org/doi/abs/10.1056/NEJM197111182852108

Keywords: tumor vessels; line-field confocal optical coherence tomography; skin cancer

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A-408

Epidermotropic Metastatic Melanoma with Metastasis to the Hypopharynx

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Background: Metastases of malignant melanoma typically involve the dermis and subcutaneous tissue and, rarely, extend into the overlying epidermis. In previous reports, the concept and criteria of epidermotropic metastatic melanoma (EMM) have been proposed as follows:

(a) dermal metastasis that is equal to or greater than epidermal metastasis,
(b) atypical melanocytes in the dermis,
(c) epidermal thinning,
(d) expansion of the dermal papillary layer with epithelial collar formation, and
(e) vascular invasion by atypical melanocytes.

However, it remains unclear whether EMM can also extend to mucosal epithelium.Methods

Methods: We examined a case with multiple metastatic lesions in the skin, hypopharynx, and lungs, assessing the histopathological characteristics of each lesion in the context of EMM. Additionally, immunostaining was performed for CCR10, CCL27, and CCL28 (with CCL27 and CCL28 being ligands of CCR10).

Results: A few months after the complete resection of the primary tumor, the patient developed multiple pigmented macules in the hypopharynx and skin, and almost simultaneously, computed tomography (CT) revealed multiple ground-glass opacities in the lungs. Based on the histopathological findings and clinical course of