

3D X-ray histology for detection of metastasis in whole lymph node specimens

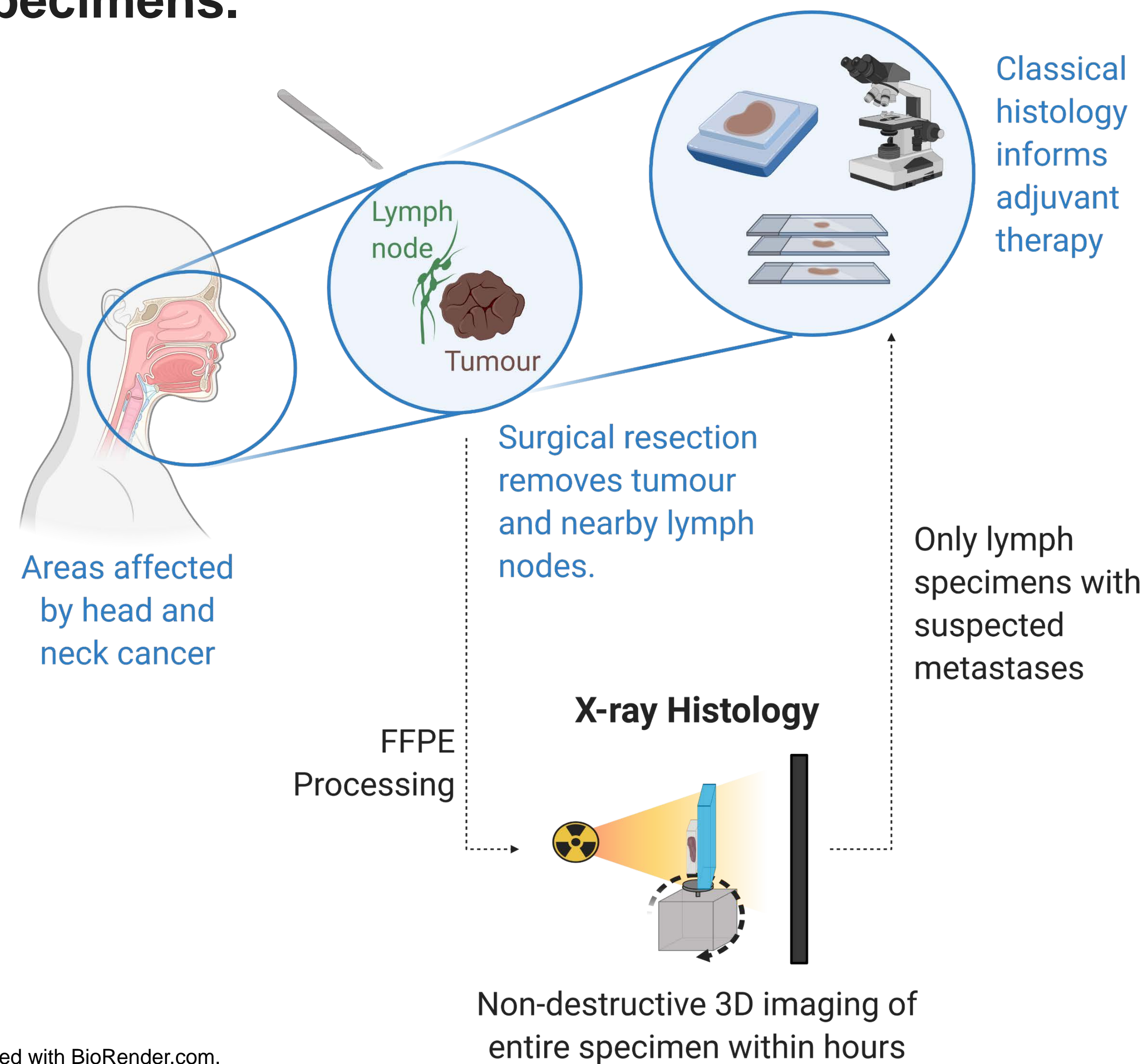
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Introduction

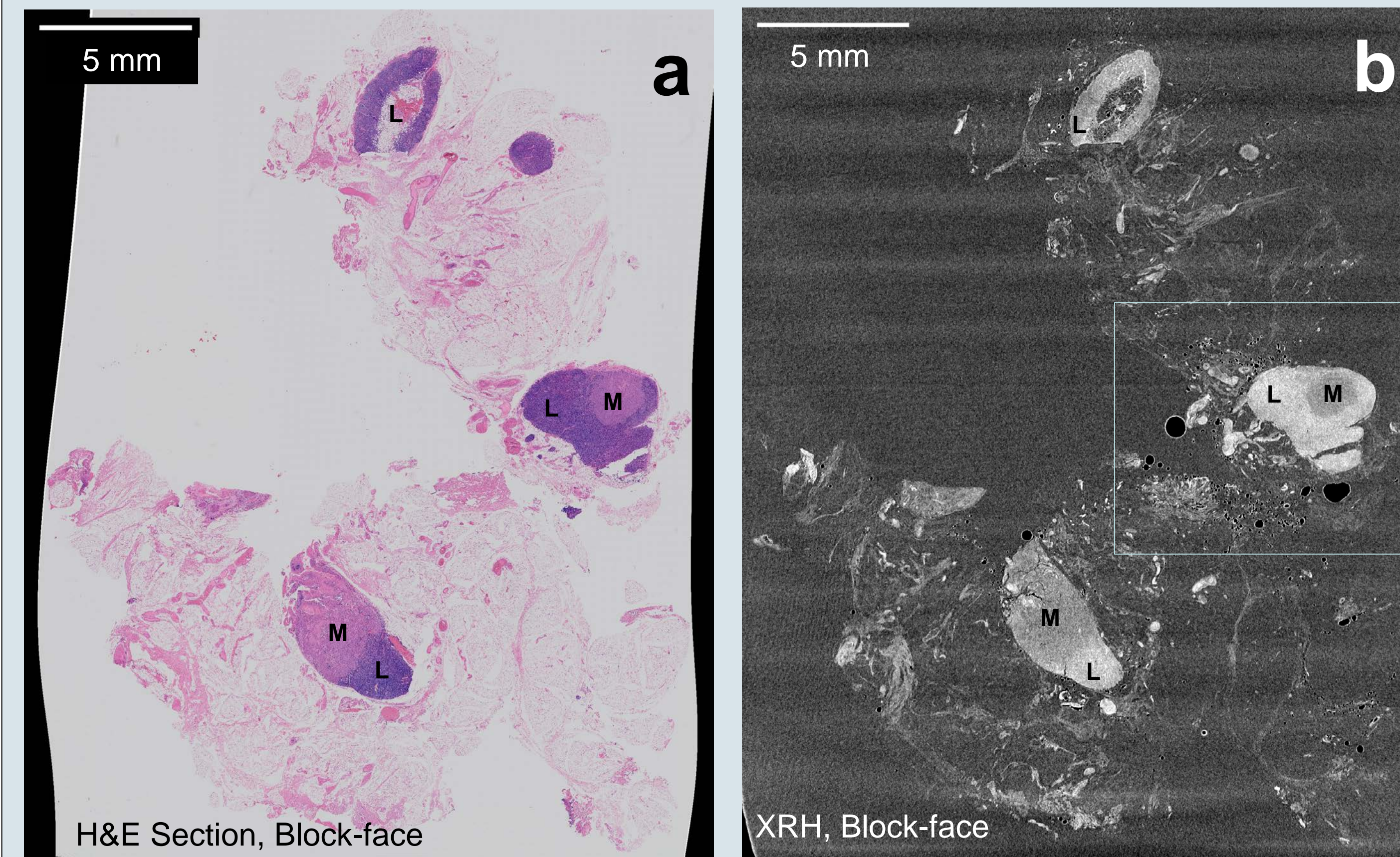
- Major surgical resection is performed in 49% of head and neck cancer cases in the UK (1).
- Metastasis in resected lymph nodes is detected with thin-section histology, which informs adjuvant therapies.
- Prepared histology slides might not sample regions of metastasis or extracapsular spread.

We propose using X-ray histology (XRH) to non-destructively detect metastasis in formalin-fixed paraffin-embedded (FFPE) lymph node specimens.

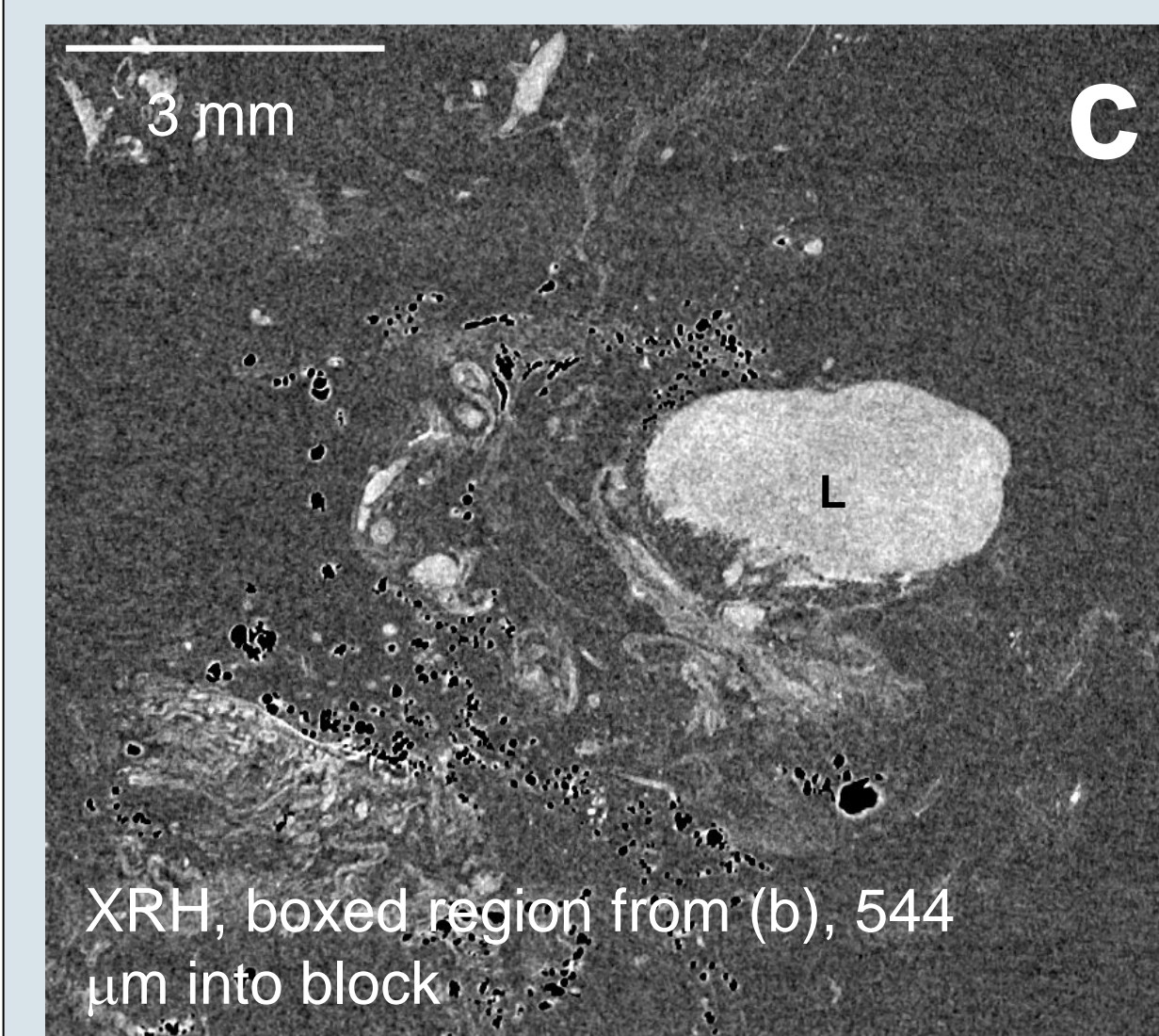


Created with BioRender.com.

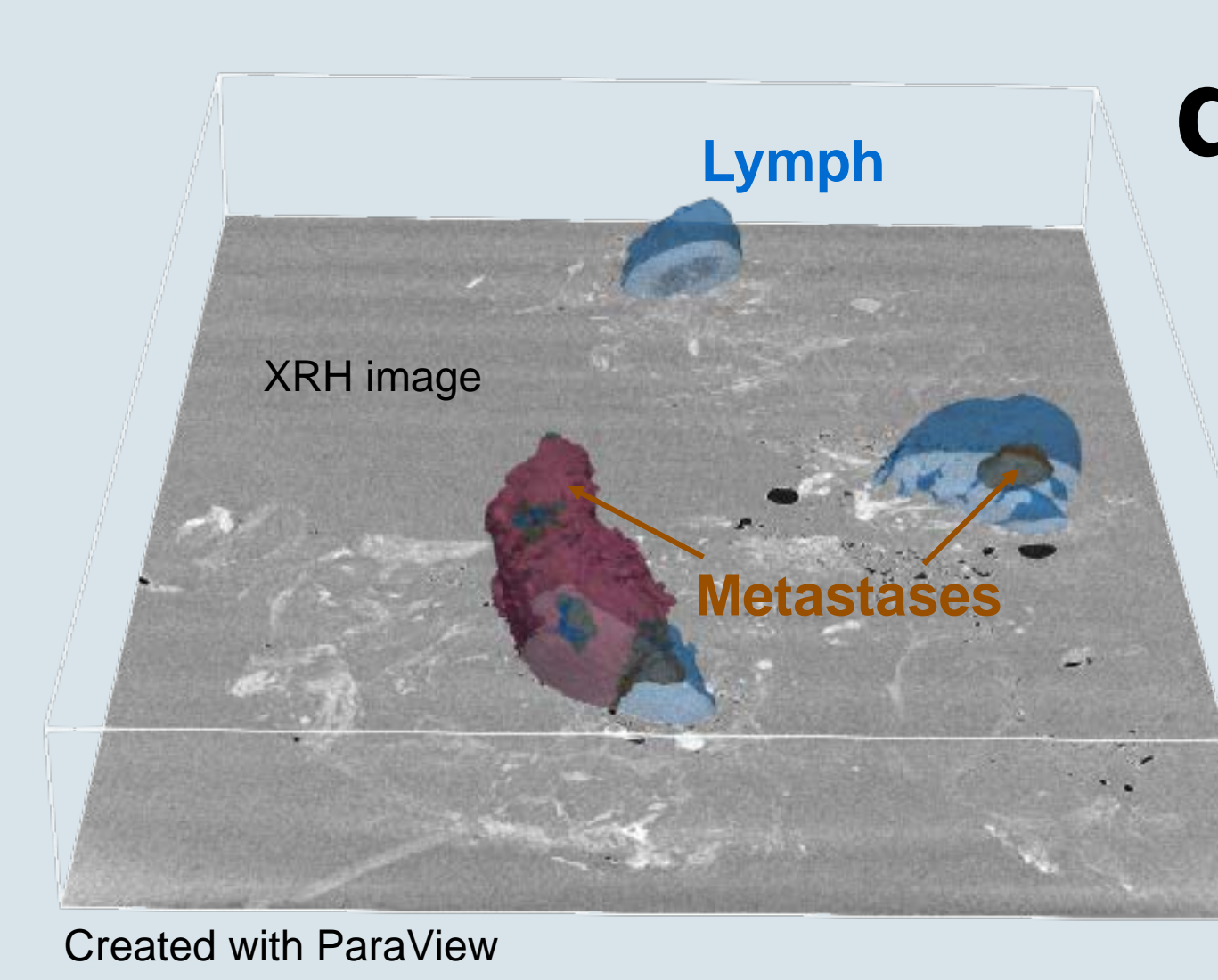
Results



Metastases (M) and lymph nodes (L) are **visible** in both XRH and histology (haematoxylin & eosin) sections.



Metastases at the block-face do not continue throughout the specimen, and **could be missed** if metastatic regions are not sampled.



Metastases and **lymph nodes** can be segmented in 3D from XRH images.

Methods

Obtaining specimens

- Archival FFPE lymph specimens from head and neck tumour resection surgeries were obtained with full ethical approval (09/H0501/90)

XRH Imaging

- Specimens were scanned with XRH (Nikon Metrology, UK) (2) at 12 μ m voxel size within 2.5 hours.

Analysis

- XRH images were processed in Fiji/ImageJ (3) and compared to digitised histology slides taken prior to XRH scanning.
- 3D segmentation of metastases and lymph nodes from XRH was performed with Ilastik (4).

Conclusion

XRH non-destructively produces virtual sections of entire formalin-fixed paraffin-embedded soft tissue specimens within hours, without additional sample preparation.

References

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Get involved, [get in touch](#) with the XRH-team!

3D X-ray Histology

Setting the foundations for X-ray micro-computed tomography workflow for non-destructive 3D X-ray histology (XRH)

μ -VIS X-ray Imaging Centre | Biomedical Imaging Unit
Funded by Wellcome Trust

www.xrayhistology.org

We are always **looking for collaborations** to explore the full potential of the technology, and **can provide open access to the technique for *proof-of-concept* studies** with qualitative inspection and quantitative image-based characterisation of the tissue.

We are particularly interested in stimulating and supporting novel and exploratory projects, introducing 3D X-ray Histology to the wider biomedical research and clinical pathology community and identifying application-specific imaging needs.

• visit: www.XrayHistology.org • contact us at info@xrayhistology.org

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