

Ice Slice Baby; Exploring the Use of Ice Embedding for Frozen Sectioning in Biobanking

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Background

The standard procedure for sectioning frozen tissue specimens at the Wales Cancer Biobank for quality assurance (QA), involves embedding samples in optimal cutting temperature compound (OCT).

OCT produces artefact in frozen tissue samples. This artefact can interfere with downstream processing, morphology assessment and QA of frozen tissue samples.

We received a project application that requested frozen sections of pancreatic tissue to be cut using water and no embedding media.

To assess the feasibility of this request, a study was performed where samples of fresh frozen kidney tumour were sectioned without OCT embedding.



Figure 1: Sample 1 OCT embedded (right) and sample 2 ice embedded (left)

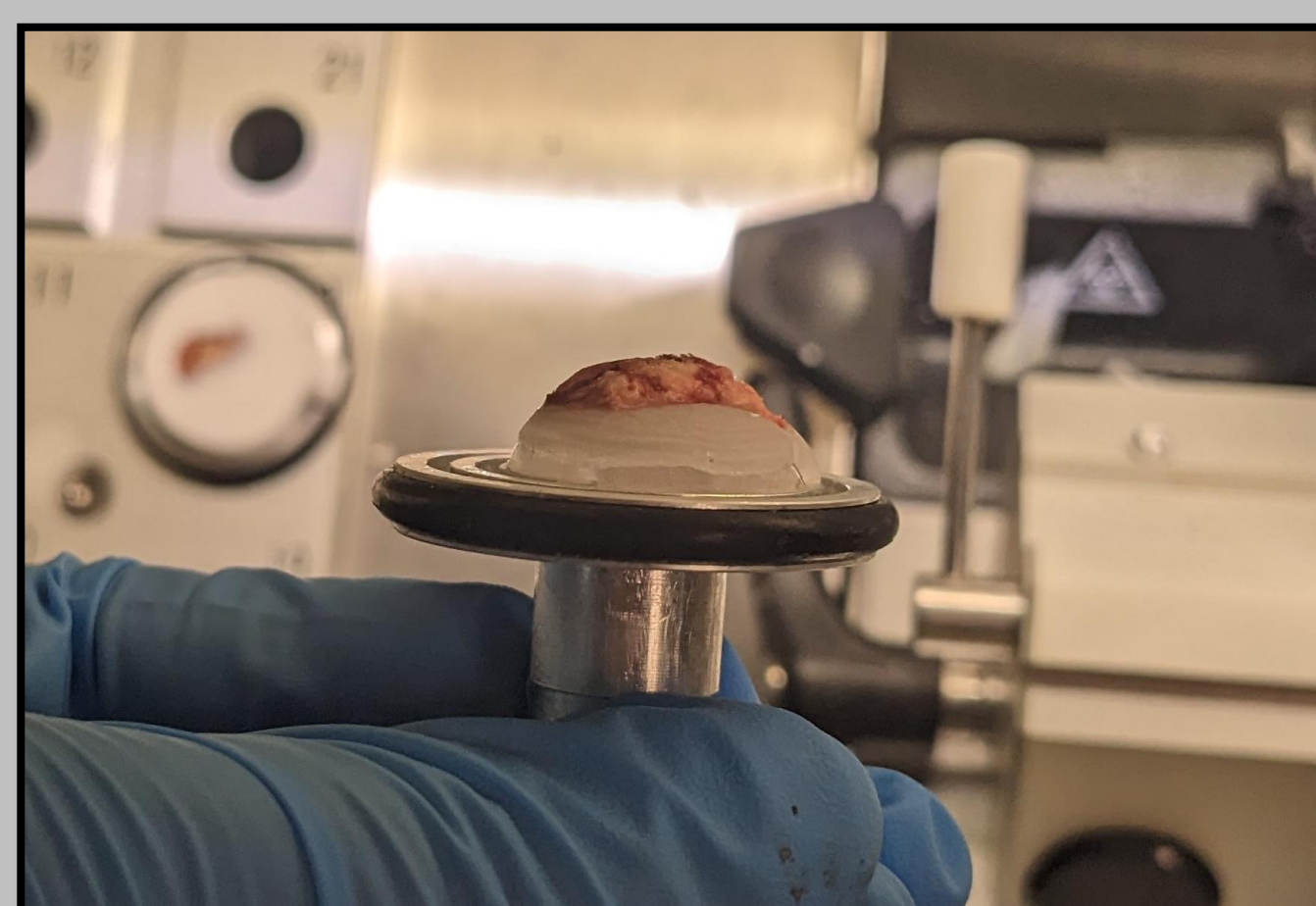


Figure 2: Sample 2 partially embedded in ice

Methods

- **Sample 1:** Cut according to the routine biobank standard operating procedure for frozen sectioning. The tissue was embedded in OCT, sectioned at 4µm at -29°C and placed onto a Superfrost microscope slide.
- **Sample 2:** Partially embedded in 1ml frozen distilled water, sectioned at 4µm at -29°C and placed onto a Superfrost microscope slide.
- Sections were stained with Haematoxylin & Eosin on a Leica Autostainer XL and reviewed by a pathologist.

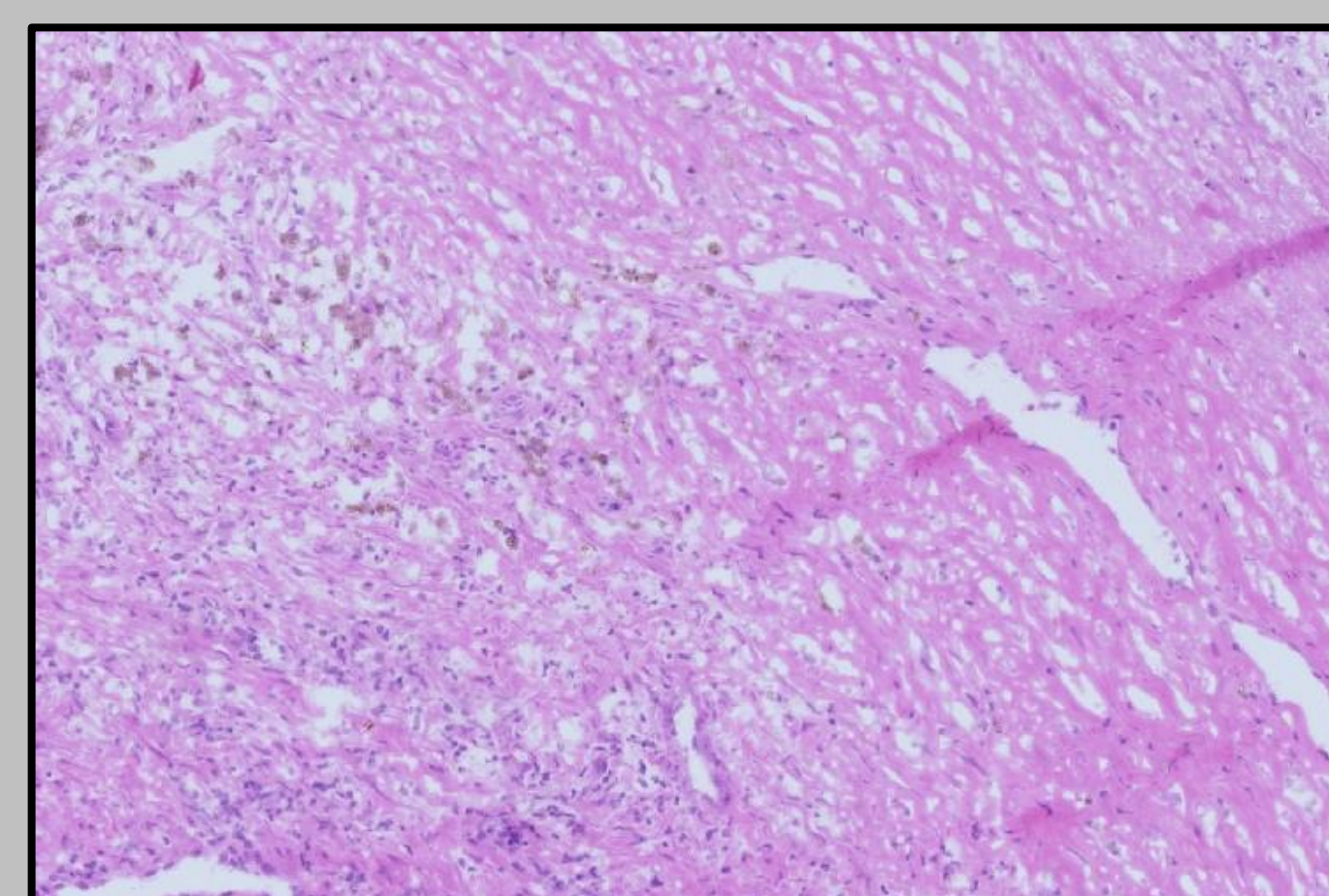


Figure 3: H&E section of sample 1

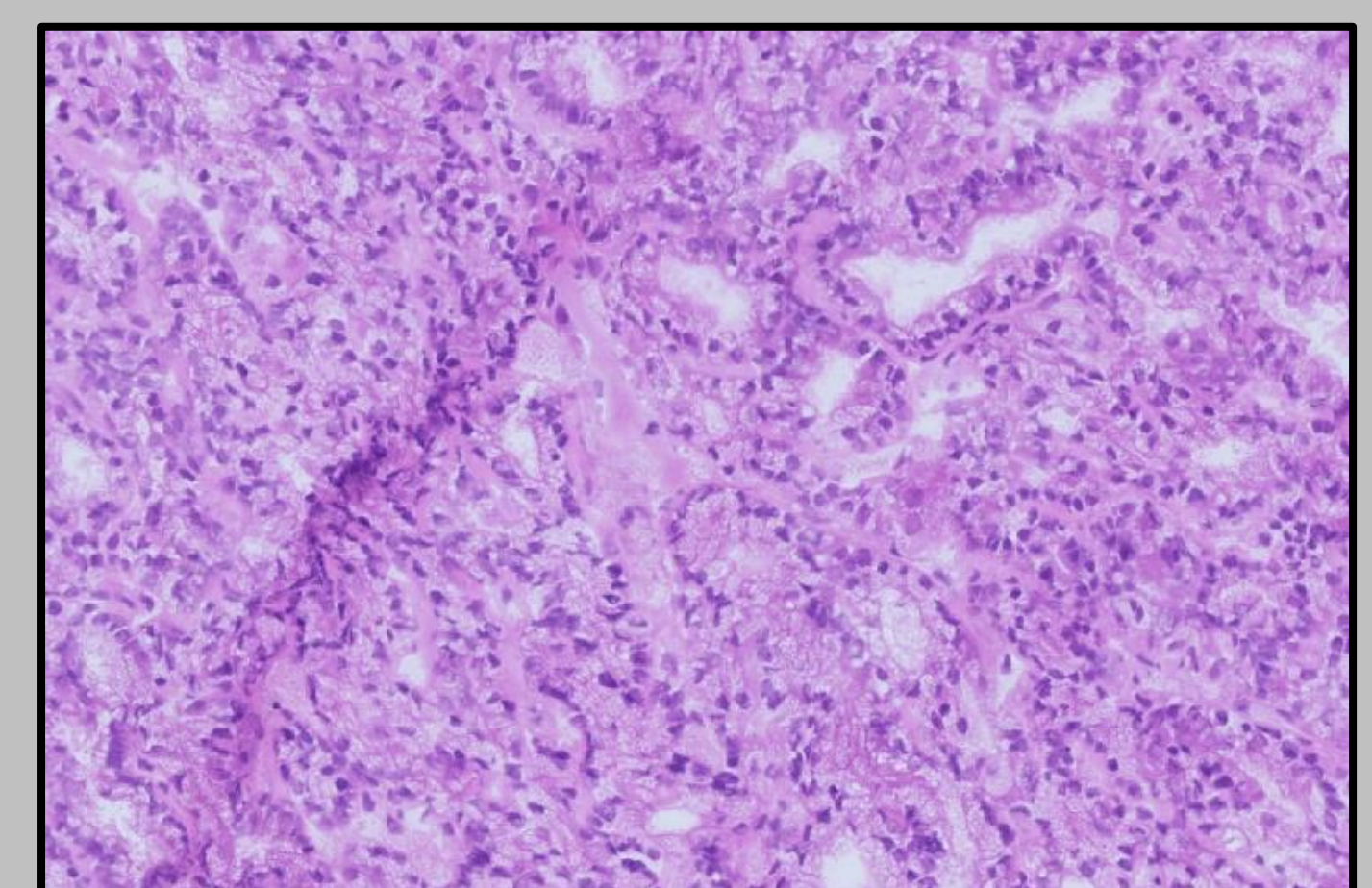


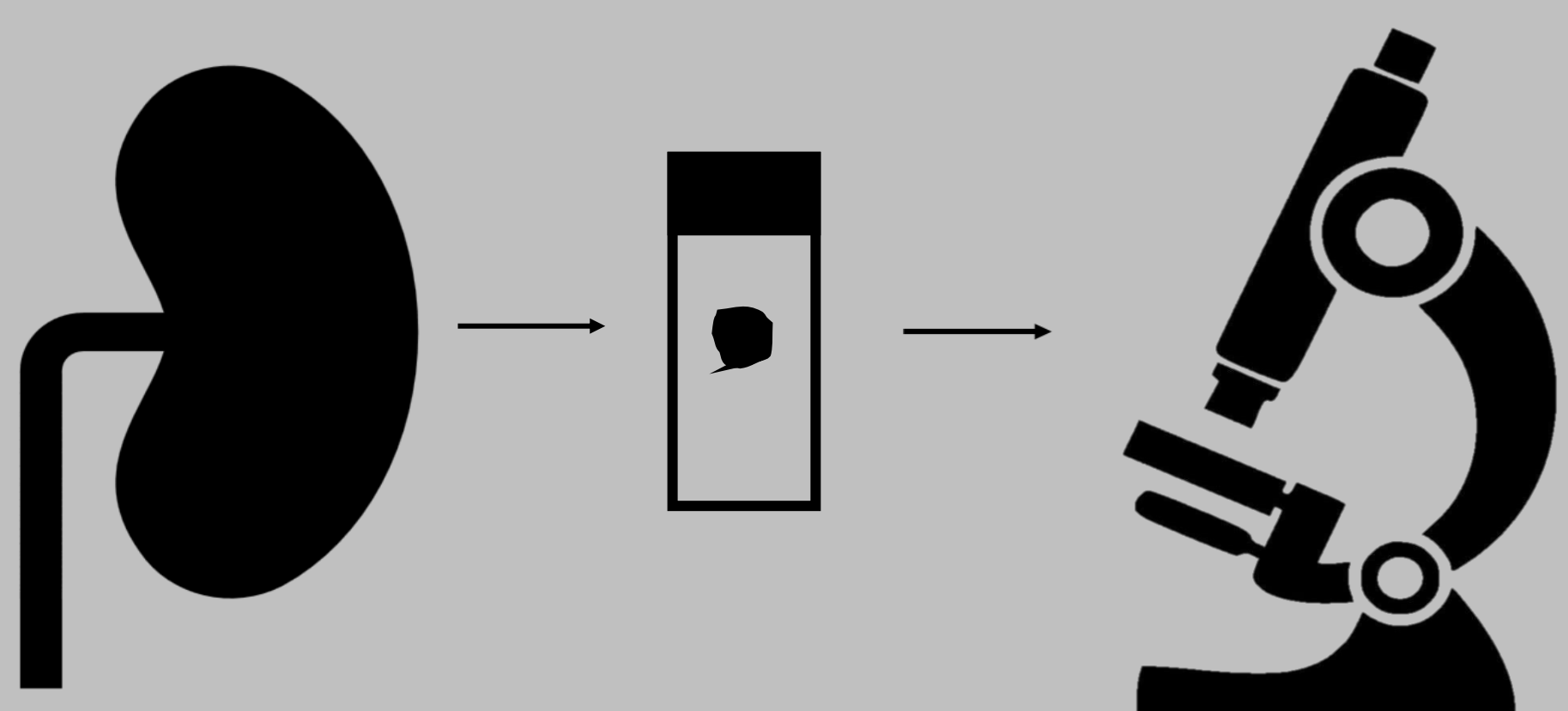
Figure 4: H&E section of sample 2

Results

- Sample 2 remained adhered to the chuck and adequate sections were obtained for QA.
- Sections from sample 2 were harder to manipulate and more folding was seen in sections from sample 2 than sample 1
- Sections from sample 2 were morphologically better due to the absence of embedding media artefact.
- The morphology of sample 2 was more comparable to the morphology of FFPE processed tissue than that of the OCT embedded frozen sections.
- The quality of the cellular morphology of the samples was still high, despite the tissue having been cryopreserved for 18 years.

Conclusions

- Partially embedding tissue in ice offers an effective alternative to OCT.
- The absence of OCT artefact provides better quality sections for QA purposes.
- Embedding fresh frozen tissue in ice submits the tissue to a freeze thaw cycle – a significant limitation for biobanks, as the preservation of sample integrity for future processing and analysis is crucial.
- Alternatively, partially embedding samples with OCT may offer the advantage of preserving tissue integrity and removing embedding artefact from sections.
- Embedding techniques are limited by tissue size and dimensions: this is problematic for samples already archived.
- Further research is needed to establish whether this embedding technique would translate to other tissue types.



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