

Development of Microwave-Assisted Thin Section Protocols for the Examination of Pathogens of Public Health Significance

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Abstract

This study develops and evaluates microwave-assisted thin section protocols for examining pathogens of public health significance. Osmium and reduced osmium tetroxide-thiocarbohydrazide-osmium tetroxide (rOTO) protocols were the standard methods for sample preparation taking 3-5 days to complete. Microwave-based rapid reduced osmium-tannic acid (rOTan) and rapid rOTO protocols were able to reduce turnaround times to as little as 6 hours, from sample receipt to sectioning. Comparative assessment of standard and microwave protocols involved a L20B cell line and Vero/hSLAM cells infected with SARS-CoV-2, showed that microwave protocols had exceptional contrast and ultrastructural resolution, reduced processing times, and improved preservation of ultrastructural integrity. The development of these microwave-based protocols offers improved public health responses by allowing for faster turnaround times and minimising sample damage due to excessive fixation and/or dehydration.

References

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