

PREFACE

Microwave Techniques and Protocols brings to the clinical and research community a how-to manual based on contributions from laboratories that are using microwaves as a means to facilitate biological sample processing. This project actually began in 1992 when Ted Pella Inc. decided to develop microwave technology for clinical and research applications. A number of questions arose almost immediately: What can microwave technology do to improve sample processing for microscopy applications? How does it work? And, most importantly, why use it?

In 1992 there was adequate literature to engender confidence that microwaves could be used to facilitate the following: (1) microwave-assisted stabilization or chemical fixation for light and electron microscopy, (2) enhanced special stain protocols for histology, (3) accelerated decalcification, (4) lower incubation times during immunocytochemistry, and (5) reduced processing times for small tissue biopsies into paraffin. The problem was where to begin when you didn't know anyone in the field. Microwave-assisted chemical fixation presented itself as the place to start to the literature interest at that time and owing to the fact that success or failure could be determined relatively quickly. It took almost three years before publication of our first paper on microwave fixation for electron microscopy (Giberson and Demaree, 1995). By 1995 we still could not locate anyone using the microwave to routinely fix tissue, and based on our experience, we could understand why. Success had come with a lot of effort, but few fundamental answers as to how or why the process worked.

Much has changed since that original paper. Protocols now exist for microwave-assisted chemical fixation for both light and electron microscopy that can be done rapidly, reproducibly, and routinely. However, fixation is only a fraction of the time required in overall sample processing. The original 1995 paper was the seed for moving forward and demonstrating that the microwave could be used for each step in processing for electron microscopy (Giberson et al., 1997). That 1997 paper described a four-hour protocol that has since been shortened to two hours (see Chapter 2). A microwave workshop series that began in the summer of 1995, and continues to this day, is the basis for the contributions to this book.

The contributors to this manual are uniformly from those laboratories routinely using microwave technology to facilitate their processing methods in the various fields of microscopy. The methods and results these authors describe are the tangible evidence that microwaves can be used routinely as the basis for improved sample processing for microscopy applications. These applications include complete sample processing protocols for light and electron microscopy, decalcification, and immunocytochemistry. The overall time savings, ease of use, and quality of results serve as justification for using microwaves in the laboratory. The question as to whether there is a “microwave effect” is alluded to, but not discussed in any great detail. When the term microwave technology is used, it is generic and intended to mean equipment designed for laboratory versus household use.

Microwave Techniques and Protocols is designed for anyone with a background and experience in sample processing for immunocytochemistry, decalcification, light microscopy, or electron microscopy, and clearly demonstrates that microwave technology has a place in today’s laboratory.

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