ELECTROMAGNETIC MEDICAL TECHNOLOGIES AND THE DIELECTRIC PROPERTIES OF TISSUES

Dr. Emily Porter
EU Marie-Curie ASSISTID Fellow, Adjunct Professor
National University of Ireland Galway

ABSTRACT

Medical devices are increasingly investigated in the academic sector with the same rigor present in a commercial setting, thus ensuring that any technology developed has a realistic chance of translating from “research bench to patient bedside” and making a positive impact on patient care. Within the context of an aging population and an exponential growth in healthcare costs, electromagnetic (EM) therapeutic and diagnostic technologies provide an attractive solution, since they are low cost, non-ionizing, and largely non-invasive. The dielectric properties of healthy and diseased tissues are the foundation for such techniques. Despite the importance of these properties, reported values have been inconsistent, especially for key heterogeneous tissues. This inconsistency results in an unsatisfactory basis for the design and optimization of EM medical technologies, and unacceptable technical risk in the translation process. This talk will discuss the state of the field, including confounders that impact the dielectric measurement of tissues, along with proposed methods for compensating for them. Needs-driven medical devices in development, including for microwave breast cancer detection, ablation of the adrenal gland to treat Conn’s syndrome, and bladder state monitoring, will also be highlighted.