

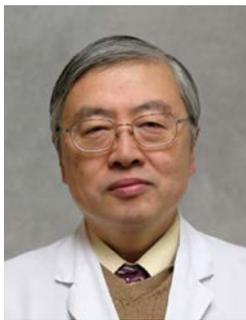
3D Dosimetry by Polymer Gel Dosimeter in Radiation Oncology

Yoichi Watanabe

Department of Radiation Oncology, University of Minnesota, Minneapolis, MN

E-mail: watan016@umn.edu

Accurate dose measurement tools are needed to evaluate the radiation dose delivered to patients by using modern and sophisticated radiation therapy techniques. However, adequate tools for direct measurements of the dose distributions in three-dimensional (3D) space are not commonly available. One such 3D dose measurement device is the polymer-based dosimeter, which changes the material property in response to radiation. These are available in the gel form, such as polymer gel dosimeters and ferrous gel dosimeters and the solid form as solid plastic dosimeters. Those are made of a continuous uniform medium which polymerizes upon irradiation. Hence, the intrinsic spatial resolution of those dosimeters is very high, and it is only limited by the method by which one converts the dose information recorded by the medium to the absorbed dose. In the presentation I will cover the basics of the 3D polymer gel dosimetry using mainly MRI as a reading method and talk about clinical applications performed by my group at the University of Minnesota with several external collaborators.



Yoichi Watanabe is a professor and chief of clinical physics at the Department of Radiation Oncology at University of Minnesota. He received his Ph.D. (1984) in Nuclear Engineering from University of Wisconsin-Madison. He started his medical physics career at Memorial Sloan Kettering Cancer Center as a research fellow; upon completing his training, he accepted an assistant professorship in radiation oncology at the Columbia University, then in 2005, he started the new Gamma Knife stereotactic radiosurgery program at the University of Minnesota (UMN). Since joining the UMN, he worked in medical physics education, research, and clinical service; had trained several Ph.D. and medical physics students during his career, he taught nuclear engineering and medical physics courses. His research focuses on 3D polymer gel and solid polymer dosimeters, Cherenkov light dosimetry, mathematical modeling of tumor, Gamma Knife physics, and radiomics and machine learning. He has over 68 journal publications and more than 102 presentations.