

Optical Spectroscopy and Imaging: An Emerging Method of Cancer Detection

Muhammad Maqbool*

Maqbool M. Optical Spectroscopy and Imaging: An Emerging Method of Cancer Detection. *Int J Radiol Case Rep.* 2021;1(1):10-11.

Cancer is a growing problem all over the world. It is one of the major causes of death around the world. Abnormal function, behavior and growth of a tissue or tissues cells is referred as tumor and a person diagnosed with one or more tumors is considered as a cancer patient. Scientists have been working to find various methods and means to prevent the spread of a tumor and stop cancer in a cancer patient. The spread of a tumor plays an important role in cancer prevention. A rapidly growing tumor is hard to control as compared to a tumor, which grows slowly. While Radiation Oncology is among the best treatment option for most of the cancer patients, treatment may get complications if tumor is diagnosed late. Therefore, it is important to diagnose a tumor in its early stages to get better treatment and

cure. Optical spectroscopy and imaging technique is an emerging area of tumor detection and cancer diagnosis in its early stages. A couple of the important optical parameters of body tissues and cells are their index of refraction and absorption coefficients when ultraviolet radiation, visible light or infrared light is absorbed or passes through a tissue to form an image of the body part or that specific tissue. Every normal tissue has its own index of refraction and light absorption ability. When the same tissue becomes a tumor, its index of refraction and absorption properties change. The deviation of the index of refraction and absorption coefficients from their values for a similar normal tissue gives an idea that a tumor has generated in the imaged tissue. Figure 1 compares changes in the index of refraction and absorption

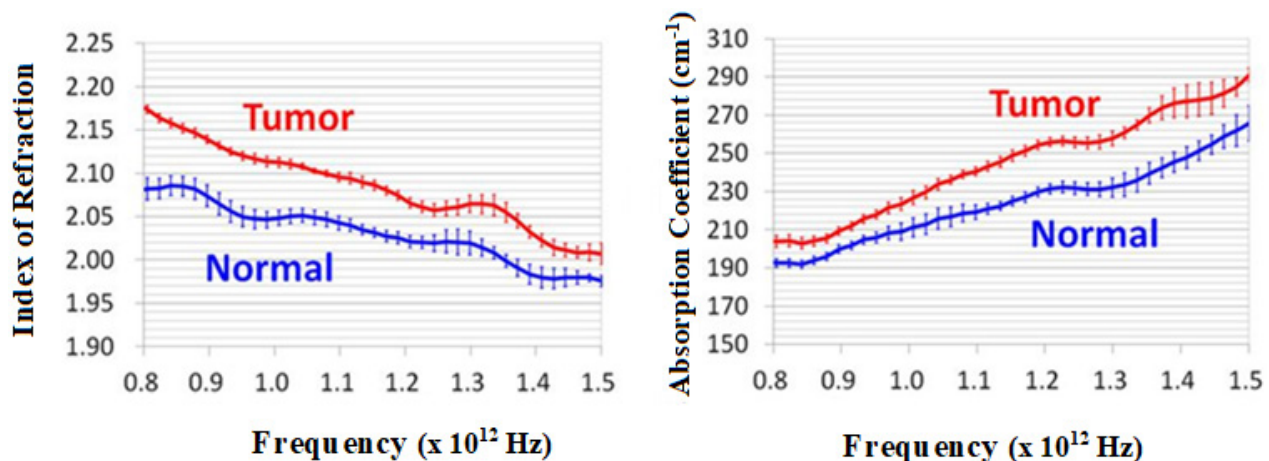


Figure 1 Change in (a) index of refraction and (b) absorption coefficient; of a normal tissue and when the same normal tissue becomes a tumor.

Department of Clinical & Diagnostic Sciences, The University of Alabama at Birmingham, Birmingham. AL 35294-1212, USA

*Corresponding author: Muhammad Maqbool, President Alabama Chapter Health Physics Society, Editor *Nanoscale Research Letters*, Associate Professor of Health Physics, Department of Clinical & Diagnostic Sciences, The University of Alabama at Birmingham, Birmingham. AL 35294-1212, USA, Tel: +1(205)9347637; E-mail: mmaqbool@uab.edu

Received: May 25, 2021, Accepted: May 31, 2021, Published: July 31, 2021



This open-access article is distributed under the terms of the Creative Commons Attribution Non-Commercial License (CC BY-NC) (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits reuse, distribution and reproduction of the article, provided that the original work is properly cited and the reuse is restricted to noncommercial purposes.

coefficients of a normal tissue and when the same tissue is converted to a tumor, at various frequencies of light.

This is a unique and successful way of a tumor detection. This method of imaging tissues by optical spectroscopic methods gives an opportunity to diagnose tumors in their early stage; as a result, tremendous improvement in cancer treatment emerges.

Despite of the fact that there are various imaging techniques used by radiologists and clinicians to image a tumor but more work is needed for early detection of a tumor. CT, MRI, Ultrasound, Mammography and Fluoroscopy are all good and successful images methods but the issue of detecting and diagnosing a tumor and cancer in its very early stages is still not resolved fully. The optical spectroscopy and imaging has provided more hope to resolve these issues and diagnose tumors in their early stage to better prevent cancer. More work is needed in this regard. Good research collaboration between universities and hospitals is certainly important in this regard.



Dr. Muhammad Maqbool is an Editorial Board Member of the International Journal of Radiology Case Reports (IJRCR). He works as an Associate Professor of Health Physics

at the University of Alabama at Birmingham, USA. He has obtained his Ph.D. degree in Physics from Ohio University, USA, M.S. degree in Medical & Radiation Physics from the University of Birmingham, UK, and First degree from the University of Peshawar, Pakistan. He teaches several courses including principles of health physics, medical radiation physics, physics of medical imaging, non-ionizing radiation, principles of dosimetry, advanced radiation biology, laser safety, and research methodology & publications analysis.

Dr. Muhammad Maqbool research and scholarly expertise and activities are in the areas of medical & health physics, radiation safety, materials for radiation shielding and protection, photonics, bio-photonics, biomedical applications of nanostructured materials and quantum mechanical modeling of biological systems. He has published 90 research papers in highly reputed peer-reviewed journals. He has published several books and book chapters. He has obtained a US Patent for inventing the Smallest AlN:Ti Infrared micro laser on optical fibers.

Dr. Maqbool works as president of the Alabama Chapter Health Physics Society. He has also been working as chair of the Gamma ray, X-ray and Ultraviolet ray technical section of the Optical Society of America. He has been an active member of several professional organizations including Health Physics Society, American Physical Society, Radiation Research Society and Optical Society of America.