OPEN ACCESS Freely available online

Pharmaceutical Analytical Chemistry: Open Access

ISSN: 2471-2698

Perspective

Infrared Spectroscopy and Its Uses in Detecting Cancer Types

Leticia Perez Rial *

Department of Chemical Engineering, University of Vigo, Pontevedra, Spain

DESCRIPTION

The infrared region of the electromagnetic spectrum, i.e. light with a longer wavelength and lower frequency than visible light, is studied *via* IR spectroscopy. The study of a molecule's interaction with infrared light is known as infrared spectroscopy. The concept of infrared spectroscopy may be examined in three ways: Reflection, emission, and absorption. Infrared spectroscopy is mostly used to determine the functional groups of molecules, which is important in both organic and inorganic chemistry. The frequency of infrared light absorbed by a molecule is determined through infrared spectroscopy. Because the frequency of the vibration of the bonds in the molecule corresponds to these specific wavelengths of light, molecules tend to absorb them. The energy necessary to activate a molecule's bonds and cause them to vibrate with greater amplitude happens in the infrared range. If a connection is polar, it will only interact with electromagnetic infrared radiation. The existence of discrete zones of partial positive and negative charge in a molecule allows the electromagnetic wave's electric field component to stimulate the molecule's vibrational energy. When the vibrational energy of a molecule changes, the dipole moment of that molecule also changes. The amount of absorption is determined by the polarity of the connection.

According to a study done by Georgia State University, a blood test using infrared spectroscopy can be used to identify two forms of cancer: Lymphoma and melanoma. Researcher's analyzed blood serum collected from experimental mice using mid-infrared spectroscopy to distinguish animals with non-lymphoma Hodgkin's and subcutaneous melanoma from healthy mice, as well as between these two tumorous states. The electromagnetic spectrum's mid-infrared spectral region is commonly utilized to describe biological material at the molecular level. Infrared spectroscopy may identify metabolic changes, according to the studies, which were published in the journal scientific reports. Non-lymphoma, Hodgkin's lymphoma, an immune system solid tumor, and subcutaneous melanoma, a lethal kind of skin cancer, are the causes, and they have diagnostic potential as a screening approach for these diseases.

According to studies, the incidence of cutaneous melanoma has grown in various locations and groups over the previous decade, especially among fair-skinned people, which has increased by 3 to 7% every year. Non-lymphoma Hodgkin's is also responsible for 4.3 percent of all new cancer cases in the United States. The existing diagnostic protocol for both malignancies, which includes tissue inspection and biopsy, is time-consuming, invasive, and expensive, resulting in low cancer prescreening compliance rates among eligible people. The development of a rapid and reliable prescreening technique for melanoma and lymphoma is crucial since early detection and treatment of these cancers improve the odds of survival for patients. In comparison to traditional vibrational spectroscopy, Fourier Transform Infrared (FTIR) spectroscopy in Attenuated Total Reflection (ATR) sampling mode produces high-quality data with improved repeatability. It has piqued the interest of experts because of its speedy and accurate diagnosis of a variety of health issues utilizing bodily fluid samples.

The previous studies explain that a quick, simple blood test for ulcerative colitis utilizing ATR-FTIR spectroscopy might be a less expensive, less intrusive alternative to colonoscopy for screening. The researchers used mice with lymphoma and melanoma tumors in their latest study. Blood serum droplets were collected from malignant and control mice and put on an FTIR instrument's ATR crystal. The serum absorbed and reflected incident infrared photons, forming a wave that was recorded and utilized to generate an absorbance curve with peaks that identified the presence of certain biomarkers in the sample. The researchers analyzed the absorbance curves of tumorous and control mice, as well as the biochemical alterations caused by non-lymphoma Hodgkin's and subcutaneous melanoma, in serum samples, are collected. Blood samples from tumor-bearing mice with melanoma and non-lymphoma ATR-FTIR spectra. The mice with Hodgkin's disease and healthy control mice both showed considerable alterations.

The findings, according to the researchers, apply to people since mice and humans share numerous markers and chemicals. Researchers found certain molecules that altered in people and animals when colitis was present in prior investigations on colitis. Researchers can construct detectors for these specific absorbance peaks using the data obtained on biomarkers for

Correspondence to: Dr Leticia Perez Rial, Department of Chemical Engineering, University of Vigo, Pontevedra, Spain, E-mail: rial_perezleticia@gmail.co.es

Received: 29-Apr-2022, Manuscript No. PACO-22-17778; **Editor assigned:** 03-May-2022, Pre QC No. PACO-22-17778 (PQ); **Reviewed:** 17-May-2022, QC No. PACO-22-17778; **Revised:** 24-May-2022, Manuscript No. PACO-22-17778 (R); **Published:** 31-May-2022, DOI: 10.35248/ 2471-2698.7.153.

Citation: Rial LP (2022) Infrared Spectroscopy and Its Uses in Detecting Cancer Types. Pharm Anal Chem.7: 153.

lymphoma and melanoma, which clinicians might use to screen patient's blood samples for these malignancies.

CONCLUSION

Doctors might start tracking a patient's blood test results as early as infancy and study them over time to see when the numbers start to alter. The data could be loaded into a computer program to do before and after comparisons of the blood samples, and accessible statistical analysis tools would detect any significant differences. This study might pave the way for more research that could lead to the creation of diagnostic procedures for the health care of melanoma and lymphoma cancer patients utilizing bodily fluid samples that can be obtained safely. The researchers hope to take samples from real patients in the future to study cancer and other disorders using infrared spectroscopy.