Fluorescence/characterization

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TOO GENERAL

Introduction

Fluorescence is a phenomena producing light from an object without any involvement of heat. It occurs when photons – light particles – are absorbed by an object and its electrons, being excited, change energy levels. This process results in light being emitted.

The phenomena is often used to characterize (describe) tissues and cells, by directing a light radiation source towards them. As different molecules will produce different fluorescence effects, a detailed image of a small tissue or cell consisting of multiple molecules can be constructed.

Use in Clinical Medicine

Fluorescence has significant use in medicine, particularly as a diagnostic and research tool – this is largely due to the accuracy of identification of fluorescence, as well as lack of associated risk and ease of use. It is also recognized for its advantages when the phenomena is applied in internal tracers,as dyes due to the relative safety from internal damage or poisoning of the patient. A number of organic (carbon-containing) material can produce fluorescence and be well detectable should it undergo radiation from a light source of a correct wavelength, which is useful in identifying certain structures or abnormalities within the body of the patient, such as cancerous growths leading to a more precise surgery procedure.

White blood cells produce fluorescence as well, which means that identification or discrimination of malfunctional cells, as well as differentiation of leukocyte families is possible as a research tool. A count of white blood cell is crucial in diagnosis and early prevention of illnesses associated with a low count of such cells.

The accuracy of fluorescence detection allows excitation of miniscule regions within living cells with the use of pulsed lasers; this leads to observing occurrences within the body that only take place within a timeframe of as little as a fraction of a nanosecond. Furthermore, this accuracy allows to recreate models of a living cell as well as the processes that happen within that cell.

The phenomena of fluorescence is widely used in fluorescence microscopes, which allow a study of different organic and inorganic materials on a cellular level. These microscopes are cutting edge technology in the medical sphere, and insofar provide one of the better ways to observe cells.

Conclusion

The significance of fluorescence as a tool in medicine has been in use for many years; as early as the 1920s, when scientists started researching its possible effects. Its properties in drugs and other substances were useful to the developing medical world, allowing tracing of the substances.

In the future, more precise methods of directing and detecting fluorescence will be developed, allowing better identification of cancer cells and non-functioning white blood cells. It will also be possible to dwell on the intricacies of inter cell workings with a higher degree of accuracy.

References

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