



MOLECULAR PATHOLOGY?

Definition

molecular pathology [*muh-**lek**-yuh-ler puh-**thol**-uh-jee*]

noun

1. tests involving nucleic acids* used in a clinical context
2. the application of molecular biology principles, techniques and tools to diagnostic medicine in a clinical laboratory

*"Nucleic acids" are long molecules inside your cells that store and transmit genetic information. DNA and RNA are examples of nucleic acids. You can learn more about the differences between DNA and RNA in other lessons.



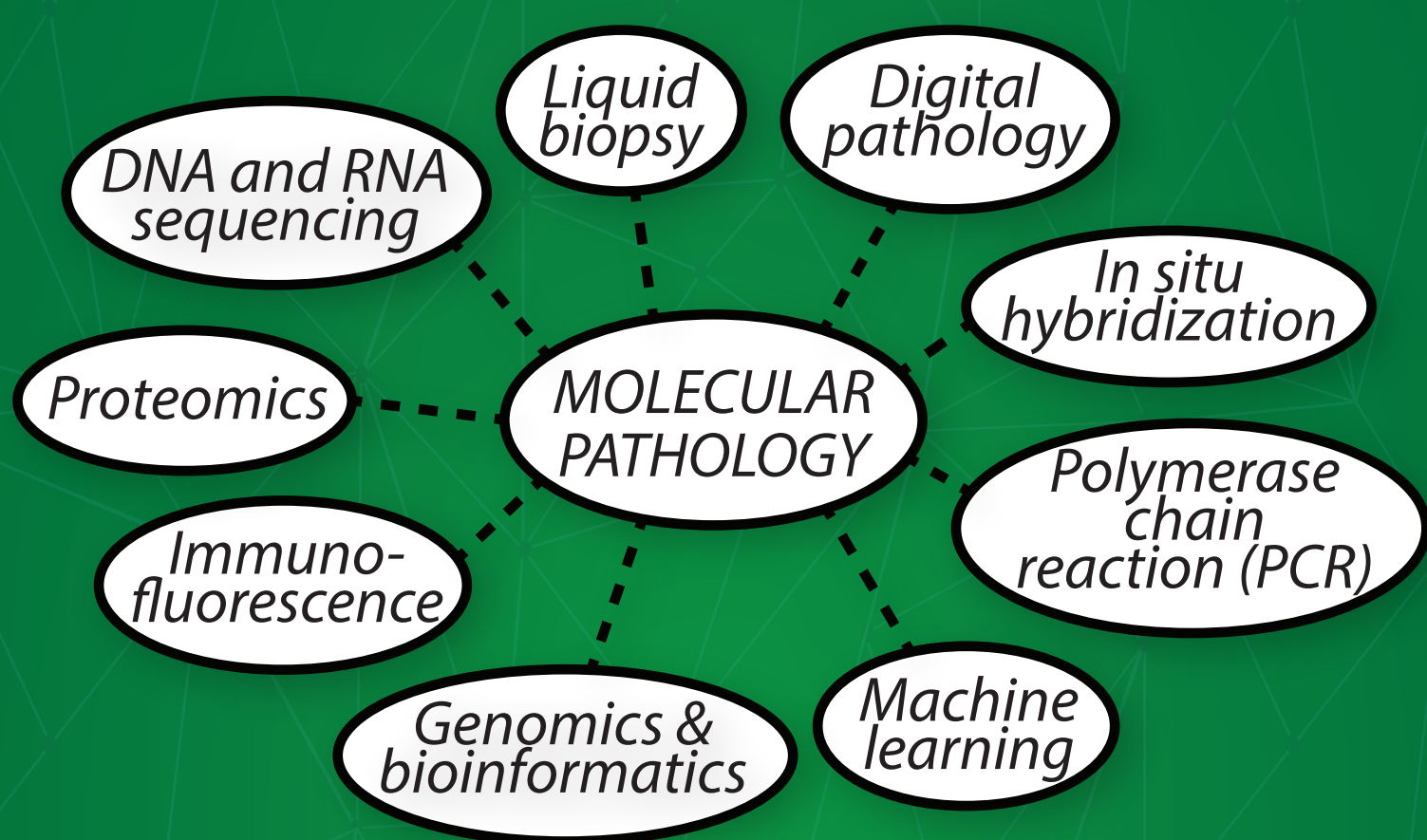
DNA



RNA

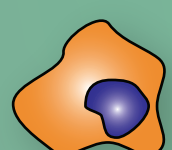
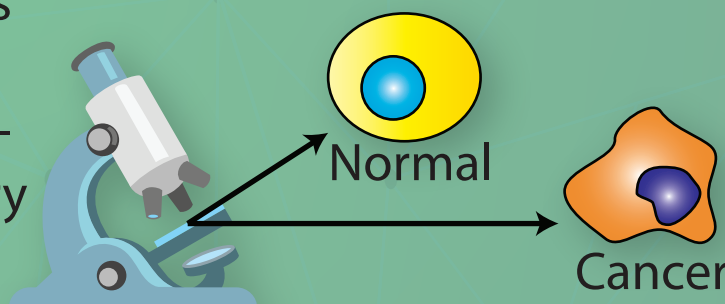
Molecular techniques and technologies

While the microscope is the primary tool of conventional pathology, molecular pathology involves a wide variety of techniques and technologies, some of which are shown below. Many of these techniques are used in diagnostics while others are applied mainly in a research context. You can learn more about some of these topics in later lessons from OMPRN and our education partners.

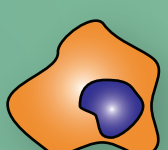


What is the role of molecular pathology in cancer care?

Pathologists are highly trained doctors who diagnose diseases, like cancer, by looking at tissue through powerful microscopes. Cancer cells can appear very different from normal cells, but some cancer cells can look like normal cells. Different types of cancer can sometimes share the same appearance.

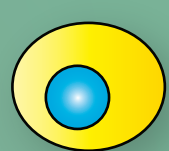


Cancer 1

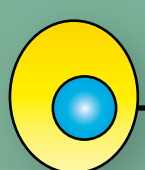


Cancer 2

Because different cancers are often treated differently, it is important to determine the type of cancer. The genetic makeup of a cell is often essential in cancer diagnosis, and molecular pathology can help in cases like these. Molecular pathologists apply a variety of the techniques and technologies shown in the section above to test the DNA from a cell for the presence of mutations that are known to cause or be associated with cancer.



Normal

Almost normal?
Cancer?Suspected
cancer cellDNA from
cellDNA
sequencingMolecular
pathology
report

Based on the type of genetic mutation, molecular pathology results can help determine the best therapy, since a particular mutation can improve the effectiveness of a treatment. This is one way that molecular pathology contributes to precision medicine and personalized therapy for cancer patients.

Summary and conclusions

Molecular pathology is a relatively new field of medicine based on molecular biology principles and techniques. Molecular pathology helps when it is difficult or impossible to diagnose cancer using a microscope alone. Molecular pathology results may sometimes lengthen the time it takes to diagnose a disease but it can greatly help patients get the personalized care they need for their particular cancer type.