

## Pathology: A Significant Field in Modern Medical Research

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### DESCRIPTION

The study of pathology analyzes the causes and effects of injury or illness, which includes a wide range of biological research areas and medical specialties. Although the term "general pathology" refers to a variety of different but related medical specialties diagnose disease, primarily through the analysis of tissue, cell, and body fluid samples. Idiomatically, pathology may also refer to the predicted or actual progression of particular diseases, and the affix pathy is sometimes used to indicate a state of disease in cases of both physical ailment (as in cardiomyopathy) and psychological conditions (such as psychopathy). Pathology is a comprehensive area of study and research that focuses on the cause, methods of development (pathogenesis), structural changes to cells (morphologic changes), and effects the clinical manifestations.

General pathology, which is performed by specialists in one of two primary specialties, anatomical pathology and clinical pathology, focuses on examining the clinical abnormalities that are markers or precursors for both infectious and non-infectious disease.

There are other divisions within a specialty based on the types of samples involved (comparisons, for instance, between cytopathology, hematopathology, and histopathology), organs (such as renal pathology), physiological systems (oral pathology), as well as the examination's primary focus (as with forensic pathology). A developing field of pathology called molecular pathology is concerned with studying and diagnosing disease by looking at molecules in organs, tissues, or physiological fluids.

Molecular pathology, which is frequently referred to as a crossover field, shares some features of practice with both anatomic pathology and clinical pathology, molecular biology, biochemistry, proteomics, and genetics. It is multidisciplinary in character and mostly concentrates on the microscopic features of illness.

One important factor is that when the diagnosis is based on both the morphologic alterations in tissues (conventional anatomic pathology) and on molecular testing, a more accurate diagnosis may be feasible. Molecular and genetic approaches to the diagnosis and classification of human diseases, the design

and validation of predictive biomarkers for treatment response and disease progression, and the tendency of people with different genetic make-ups to develop disorders are all included in this scientific field.

Cancer and infectious disease diagnosis frequently involve molecular pathology. Quantitative Polymerase Chain Reaction (qPCR), multiplex PCR, DNA microarray, *in situ* hybridization, *in situ* RNA sequencing, DNA sequencing, antibody-based immunofluorescence tissue assays, molecular profiling of pathogens, and analysis of bacterial genes for antimicrobial resistance.

Molecular Pathological Epidemiology (MPE), which stands for integrative molecular biologic and population health research, is an interdisciplinary field that developed from the fusion of "molecular pathology" and "epidemiology."

### Molecular diagnostics

When molecular biology is applied to medical testing, the term "molecular diagnostics" refers to a group of procedures used to examine biological markers in the genome and proteome as well as how cells express their genes as proteins.

In both medicine and agricultural biosecurity, the technique is used to monitor crop- and livestock disease, estimate risk, and determine the isolation measures must be taken. In medicine, it is used to diagnose and monitor disease, detect risk, and decide which therapies will work best for individual patients. Molecular diagnostics allows the possibility of customized medication by examining the particulars of the patient and their illness.

Infectious illness, oncology, human leucocyte antigen type (which examines and forecasts immunological function), coagulation, and pharmacogenomics-the genetic prediction of which medications will work best are among the medical disciplines and in which these tests are helpful.

### CONCLUSION

The field of Molecular Pathological Epidemiology combines pathology and epidemiology. Epidemiology of molecular pathology and disease heterogeneity is described. MPE intends

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to attain this goal at the molecular, individual, and population levels. Pathology and epidemiology have the same goal of revealing the origin of disease. Typically, tissue pathology resources and data from existing epidemiology research are used

in MPE. MPE and conventional-type molecular epidemiology using conventional disease nomenclature systems are two broad categories of molecular epidemiology.