Volume 1, Issue 1 FEBRUARY 2005

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PCR

THE POLYMERASE CHAIN REACTION

PCR, the quick, easy method for generating unlimited copies of any fragment of DNA, is one of those scientific developments that actually deserves timeworn superlatives like "revolutionary" and "breakthrough."

First described only 10 years ago, in its short life PCR has transformed the life sciences utterly. From the daily practicalities of medical diagnosis to the theoretical framework of systematics, from courts of law to field studies of animal behavior, PCR takes analysis of tiny amounts of genetic material-even damaged genetic material-to a new level of precision and reliability.

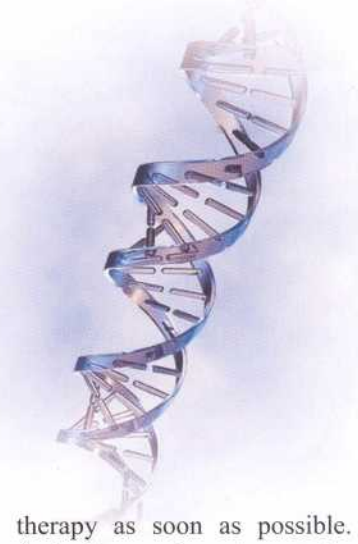
PCR has very quickly become an essential tool for improving human health and human life. Medical research and clinical medicine are profiting from PCR mainly in two areas: detection of infectious disease organisms, and detection of variations and mutations in genes, especially human genes. These PCR-based analyses are proving to be just as reliable as previous methods-sometimes more so-and often much faster and cheaper.

The method is especially useful for searching out disease organisms that are difficult or impossible to culture, such as many kinds of bacteria, fungi, and viruses, because it can generate analyzable quantities of the organism's genetic material for identification. PCR looks directly for the virus's unique DNA, instead of the method employed by the standard test, which looks for indirect evidence that the virus is present by searching for antibodies the body has made against it.

PCR can also be more accurate than standard tests. PCR can detect bacterial DNA where even blood culture methods failed to detect. PCR can also detect organism's DNA in body fluids permitting early and speedy treatment preventing serious complications.

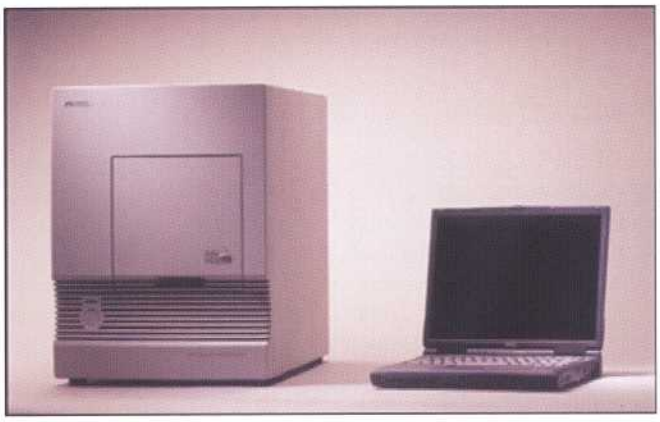
More than 60 PCR protocols for identifying pathogens have been described to date, and at least 10 clinical products are available for detecting the evasive organisms that cause such diseases as ulcers, herpes, tuberculosis, chlamydia, viral meningitis, viral hepatitis, AIDS, and cytomegalovirus. It can even distinguish the particular strain of papillomavirus that predisposes to cancer, which other tests cannot do.

PCR also helps doctors track the presence or absence of DNA abnormalities characteristic of particular cancers, so that they can start and stop drug treatments and radiation therapy as soon as possible. And it promises to greatly improve the genetic matching of donors and recipients for bone marrow transplantation.



PCR can even diagnose the diseases of the past. Historical medical genetics has gone even further back in time with PCR.

Many of the new genetic tests are the result of the Human Genome Project, the huge international effort to identify and study all human genes. Scientists expect the Human Genome Project to be finished shortly after the turn of the century. It is moving more rapidly than originally expected toward its ultimate goal, which is to sequence all the DNA in typical human cells.



"PCR is the most important new scientific technology to come along in the last hundred years."

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