polymerase chain reaction

new horizons in medicine

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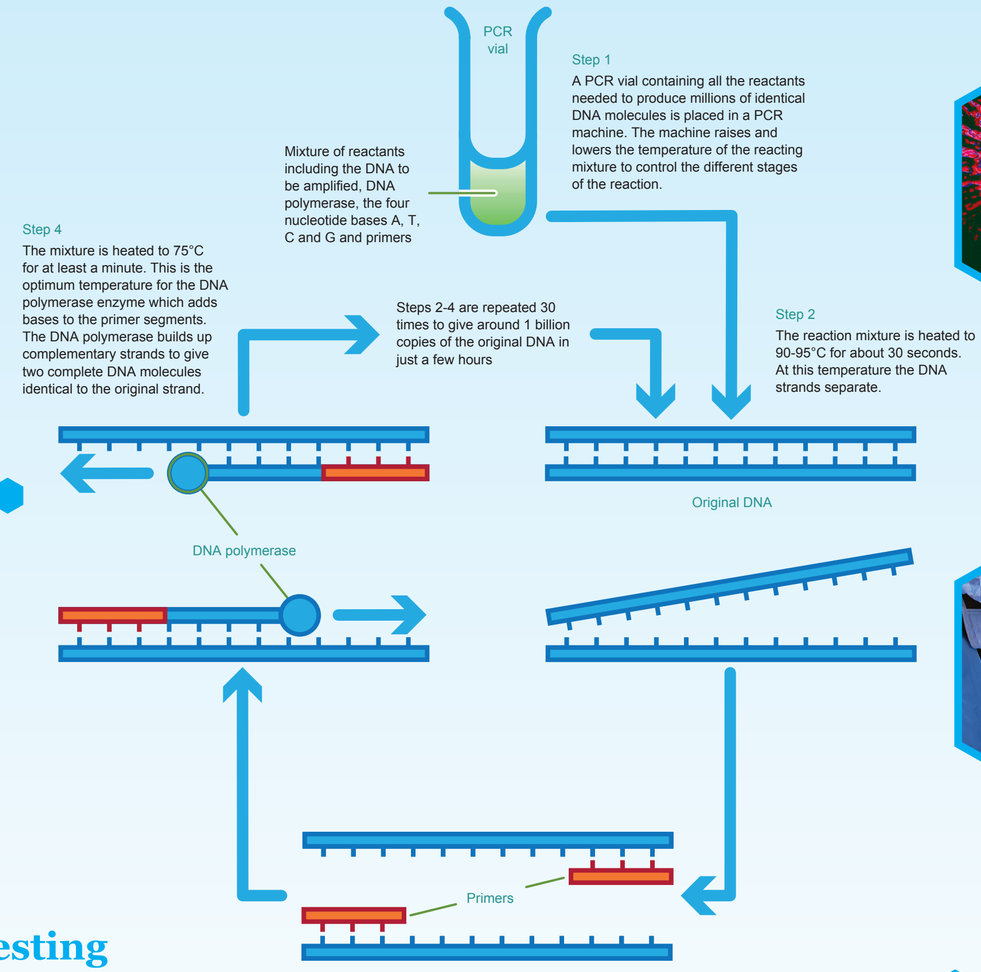
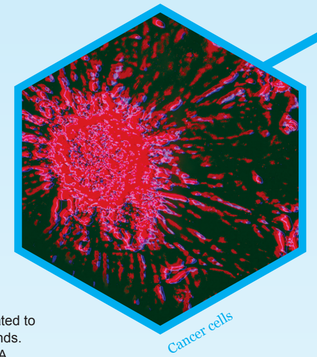
Bringing medicines to *life*

The polymerase chain reaction (PCR) has revolutionised molecular biology and DNA technology. Invented in the 1980s by Kary B Mullis, PCR enables us to produce large quantities of DNA from very small samples in a remarkably short time. The process has been refined over the years but the basic principle remains exactly the same. PCR makes it possible for us to analyse tiny samples of DNA and unravel the mysteries of the individual genes.



Cancer warning


Cancer cells

Using PCR to amplify DNA, scientists are developing tests to pick up the genetic changes in cancerous cells early in the disease. Using PCR we can already detect bowel cancer from the DNA of cells extracted from the faeces – a rapid, easy way to make an early diagnosis and increase treatment success. PCR is also being used, along with genome sequencing, to track mutations within cancers as the disease progresses. Scientists hope this will lead to more effective targeting of chemotherapy in future.

Infection detection

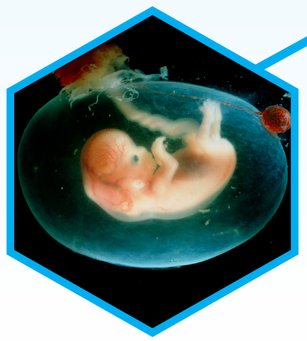

Wellcome Library, London

Amplifying the DNA from a single bacterium or virus using PCR can provide a speedy and accurate diagnosis for serious infections, where getting the right treatment quickly can mean the difference between life and death. PCR is already used in the diagnosis of AIDS, viral meningitis, TB and an ever-growing number of other infections. PCR can also be used to amplify the DNA of a pathogen so it can be sequenced. This can enable scientists to pinpoint the source of some serious outbreaks of infection.

Tissue matching

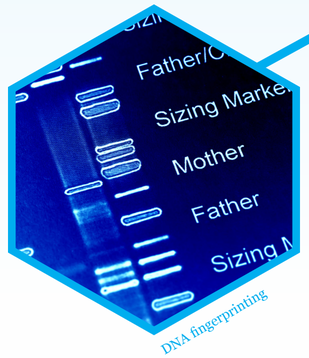
In organ transplants, a close tissue match between the donor and the recipient reduces the chances that the new organ will be rejected. PCR technology is leading to increasingly sophisticated levels of tissue matching at the DNA level – and more successful transplants.

Genetic testing



PCR makes it easier to identify individuals who carry the genes responsible for problems such as cystic fibrosis and muscular dystrophy. It is the key process in prenatal testing of foetuses at risk of carrying severe genetic conditions. PCR is also used for preimplantation testing of IVF embryos at risk of genetic conditions, amplifying the DNA, or even a single gene, from a single cell.

Forensic medicine



DNA fingerprinting

PCR is the first stage in DNA profiling – also known as DNA fingerprinting. The ability to amplify the tiniest fragment of DNA found at a crime scene has resulted in amazing developments in identifying and eliminating suspects in crimes including murder and rape, even years after the event. PCR is also used to identify relatives in immigration cases and fathers in paternity cases.

more information: www.abpischools.org.uk

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