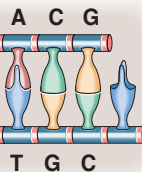


DNA chips to diagnose cancers

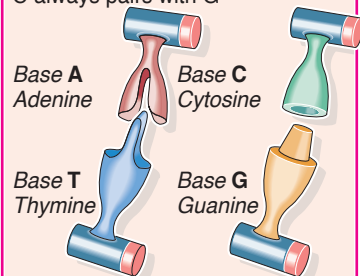
Each year more than 15,000 women in Britain die from breast cancer and 1 in 10 women develop it. Benign cancers can be treated with surgery, but malignant, run-away mutations may require chemotherapy or radiation to halt their spread. DNA chips enable doctors to analyse patients' genes, specifically a key cancer gene known as p53, to select the best treatment

DNA: Made from only four 'bases' known by the letters A, C, G and T



p53: Normal p53 genes induce cells to self-destruct if their DNA blueprint is irreparably damaged. If p53 gene itself mutates then tumours can spread aggressively

Bases: A always pairs with T, C always pairs with G



1 DNA is extracted from tissue cells to test for p53 mutations

2 DNA double helix is 'unzipped' and strands are chopped into fragments using an enzyme

3 DNA chip: Sample, containing fragments of unzipped gene sequences, is pumped over probes on DNA chip

Probes: Chip covered with checkerboard of 64,000 tiny squares, each – half the width of a human hair – holding a 'DNA probe'

4 p53: Sequence sticks to probes which mimic opposite strand of bases from which they were separated. Gene fragments that have found no mate are washed away

Fluorescent molecules attach to ends of fragments

5 **Scanner:** Chip loaded into scanner. Laser light scans probes on chip row by row, stimulating fluorescent molecules, generating brilliantly coloured read-out

Read-out shows probes which found matching DNA in sample

6 **Normal p53 gene:** Patient may not need aggressive therapy

Mutated p53 gene: Doctor and patient can decide on best treatment