

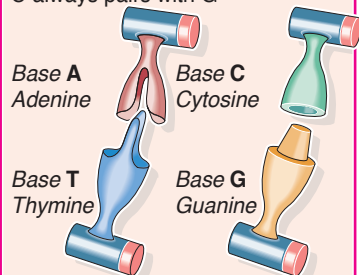
# DNA chips to diagnose cancers

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

Fluorescent molecules attach to ends of fragments

**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

Read-out shows probes which found matching DNA in sample

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

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

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