

CANCER EXPLAINED



What is cancer?

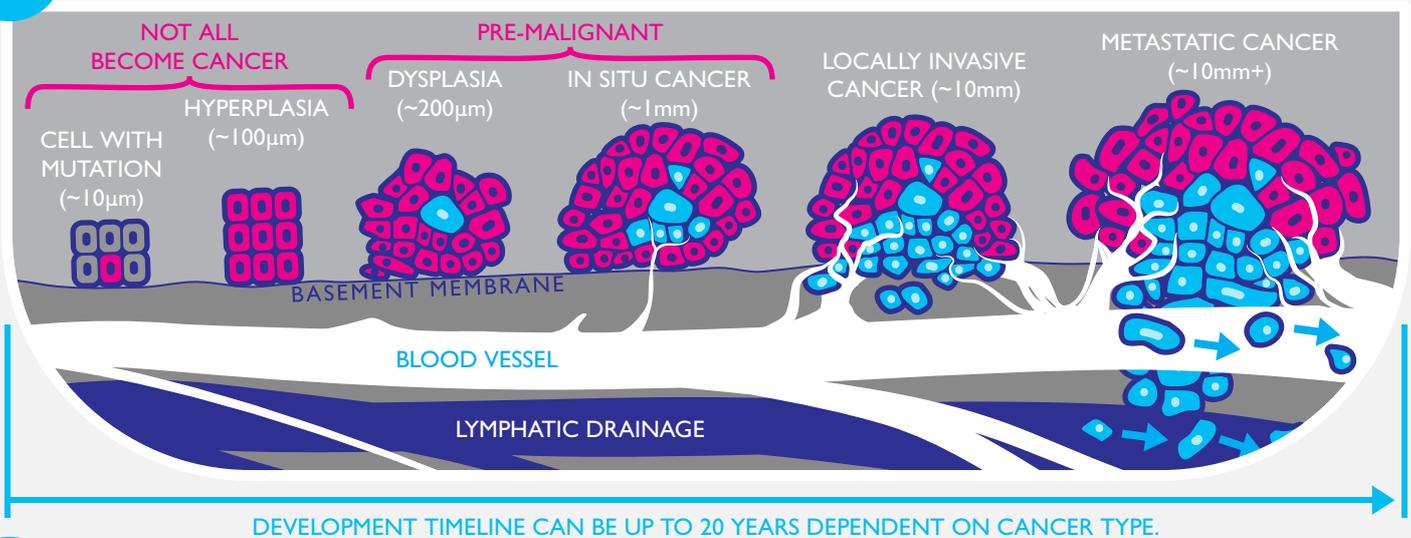
Cancer is often thought of as a single disease, however there are many known types which behave in different ways. The common factor is out of control multiplication of cells followed by tissue invasion and spread to other sites in the body. Cancer is caused by faults in genes (mutations) that control the way cells multiply, divide and renew. Some mutations occur due to errors during the natural process of cell division and renewal, others are due to influences from lifestyle and environmental factors and some mutations are inherited.

Different cancers have different mutation combinations and further mutations continue to occur as the cancer develops. Most tumours have mutations in more than one key gene which can cause the following:

- Oncogenes encourage cells to multiply (HER2, KRAS).
- Tumour suppressor genes no longer control cell multiplication (TP53, BRCA1 & BRCA2).
- DNA repair genes stop repairing other damaged genes.
- Self-destruction genes no longer tell cells to die if they become too old or damaged.



How cancer develops



Cancer staging & grading

The stage of a cancer describes the disease progression.

Two main staging systems are commonly used in the UK - the TNM (Tumour, Node, Metastasis) and Number systems.

The TNM staging system is the more complex of the two and separately categorises the Tumour size and the spread to lymph Nodes and the rest of the body (Metastasis). Below are examples of some TNM tumour classifications.

- T1N0M0 : a small tumour that has not spread.
- T2N1M0 : a larger tumour that has spread to a nearby lymph node.
- T4N2M1 : a very large tumour that has spread to multiple lymph nodes and elsewhere.

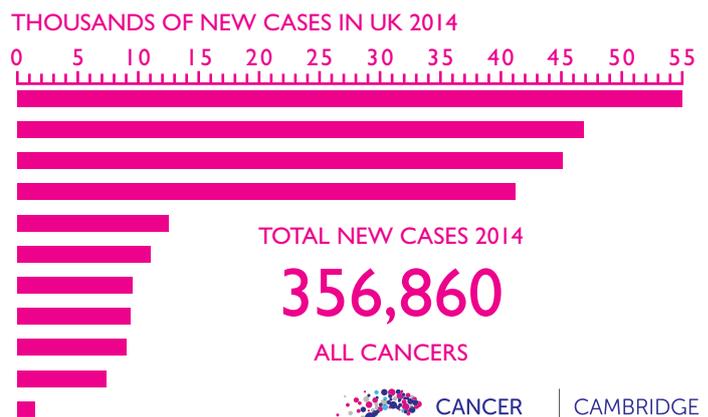
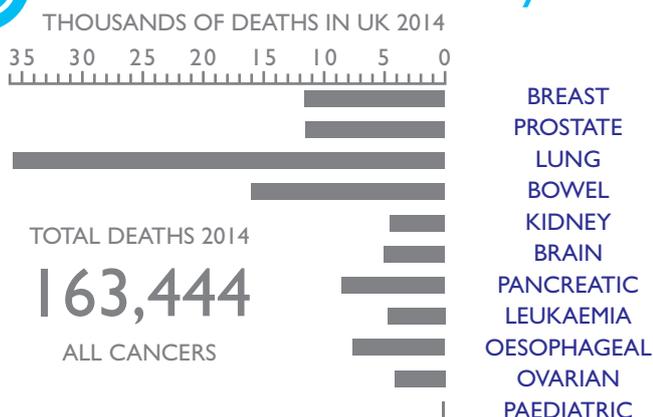
The number staging system is more simple and categorises most cancers into 4 stages - from Stage 1 (early cancer with a small tumour that has not spread) to Stage 4 (advanced cancer which has spread to another area of the body). The two systems align but detail varies for different cancers.

Another approach used in the USA stages the cancer as Localized, Regional (spread to lymph nodes) or Distant (metastasised).

The grade of a cancer is determined from analysis of a biopsy by a pathologist and describes the appearance of the cells. Most cancers are graded from 1-3, some have 4 grades. The more abnormal the cells look, the higher the grade. Low grade cancers generally grow more slowly and are less likely to spread than high grade cancers.



Incidence and mortality for some common cancers in the UK



Calculated by the Statistical Information Team at Cancer Research UK, 2016

For more information visit www.cancerresearchuk.org. To discuss opportunities contact EDAdmin@hermes.cam.ac.uk



CANCER RESEARCH UK

CAMBRIDGE CENTRE