

# The growth of a cancer

## The growth of a cancer

If it is accepted that a cancer starts from a single transformed cell then it is possible, using straightforward arithmetic, to describe the progression from a single cell to a mass of cells large enough to kill the host. The division of a cell produces two daughter cells. The relationship  $2^n$  will describe the number of cells produced after  $n$  generations of division. There are between  $10^{13}$  and  $10^{14}$  cells in a typical human being. A 9 mm tumour in diameter will contain about  $10^9$  cells. Since  $2^{30} = 10^9$  this implies that it would take 30 generations to reach the threshold of clinical detectability and, as  $2^{15} = 32,000$  will take fewer than 15 subsequent generations to produce a tumour that, through sheer bulk alone, would be fatal. This is an oversimplification because cell loss is a feature of many cancers: for squamous cancers as many as 99% of the cells produced may be lost, mainly by exfoliation. It will, in the presence of cell loss, take many cellular divisions to produce a clinically evident tumour. The growth of a typical human tumour can be described by an exponential relationship, the doubling time of which increases exponentially - so-called Gompertzian growth ( Figure 12.2 ). The growth of a cancer

If it is accepted that a cancer starts from a single transformed cell then it is possible, using straightforward arithmetic, to describe the progression from a single cell to a mass of cells large enough to kill the host. The division of a cell produces two daughter cells. The relationship  $2^n$  will describe the number of cells produced after  $n$  generations of division. There are between  $10^{13}$  and  $10^{14}$  cells in a typical human being. A 9 mm tumour in diameter will contain about  $10^9$  cells. Since  $2^{30} = 10^9$  this implies that it would take 30 generations to reach the threshold of clinical detectability and, as  $2^{15} = 32,000$  will take fewer than 15 subsequent generations to produce a tumour that, through sheer bulk alone, would be fatal. This is an oversimplification because cell loss is a feature of many cancers: for squamous cancers as many as 99% of the cells produced may be lost, mainly by exfoliation. It will, in the presence of cell loss, take many cellular divisions to produce a clinically evident tumour. The growth of a typical human tumour can be described by an exponential relationship, the doubling time of which increases exponentially - so-called Gompertzian growth ( Figure 12.2 ). The growth of a cancer

If it is accepted that a cancer starts from a single transformed cell then it is possible, using straightforward arithmetic, to describe the progression from a single cell to a mass of cells large enough to kill the host. The division of a cell produces two daughter cells. The relationship  $2^n$  will describe the number of cells produced after  $n$  generations of division. There are between  $10^{13}$  and  $10^{14}$  cells in a typical human being. A 9 mm tumour in diameter will contain about  $10^9$  cells. Since  $2^{30} = 10^9$  this implies that it would take 30 generations to reach the threshold of clinical detectability and, as  $2^{15} = 32,000$  will take fewer than 15 subsequent generations to produce a tumour that, through sheer bulk alone, would be fatal. This is an oversimplification because cell loss is a feature of many cancers: for

squamous cancers as many as 99% of the cells produced may be lost, mainly by exfoliation. It will, in the presence of cell loss, take many cellular divisions to produce a clinically evident tumour. The growth of a typical human tumour can be described by an exponential relationship, the doubling time of which increases exponentially – so-called Gompertzian growth ( Figure 12.2 ).

---

Revision #1

Created 2025-12-31 15:08:41 UTC by Omar Ayman

Updated 2025-12-31 15:08:41 UTC by Omar Ayman