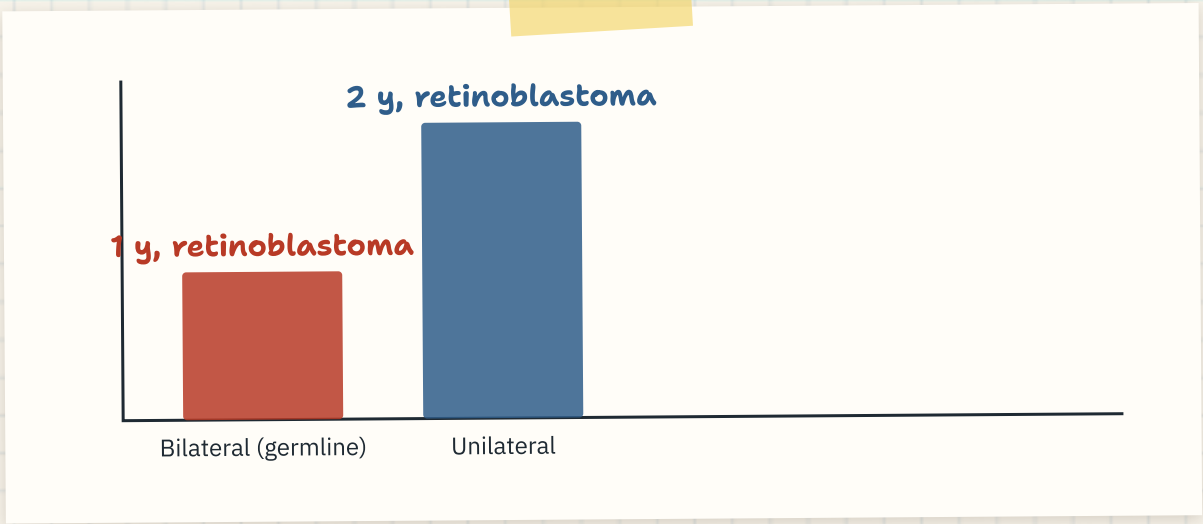
Oncogene vs tumour suppressor

One hit or two: gain vs loss of function



Step by step

1. Proto-oncogene mutated or overexpressed: oncogene
2. Oncogene switched on by point mutation, translocation or amplification
3. Tumour suppressor: both copies lost (Knudson)
4. Second hit is often loss of heterozygosity

MADE-UP ODDS

Inherited: $10^{7} \times 10^{-6} \approx 10$ hits

Sporadic: $10^{-12} \times 10^{7} = 10^{-5}$. Invented numbers, not real rates

	Oncogene	Tumour suppressor
Function	Gain	Loss
Hits	One, dominant	Two, both copies
Role	Accelerator	Brake
Examples	RAS, MYC, BCR-ABL, HER2	RB1, p53, APC

Two classes of cancer gene

Rule of thumb

Oncogene = accelerator stuck down

Tumour suppressor = brake removed

Germline first hit = early, multiple, bilateral

Exam traps

- Oncogenes act dominantly; tumour suppressors need both copies lost.
- Inheritance looks dominant, but the gene works recessively in each cell.
- A sporadic tumour needs both hits in one cell.

Oncogenes vs tumour suppressor genes: one hit or two

Video, written lesson, practice question and sources: medservatory.com/usmle-step-1/haematology-oncology/oncogenes-vs-tumour-suppressor-genes-two-hit

For exam study only, not medical advice. Follow local guidelines and your lab's ranges.
© 2026 Medservatory, a project of ADMR Solutions Ltd.
Free to print and share for personal study.