

The Ten Hallmarks of Cancer

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1. Sustained proliferation: Cancer cells multiply out of control by creating proteins that encourage their explosive growth.

2. Insensitivity to antigrowth signals: Cancer cells disarm the process the body uses to put the breaks on unwanted cell division.



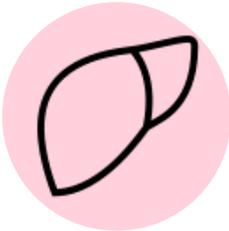
3. Evasion of apoptosis (also known as cell suicide): Normal cells self-destruct when they detect an error (mutation) that cannot be repaired, but cancer cells thrive despite these errors.

4. Limitless replication potential: Normal cells die after a certain number of divisions. Conversely, cancer cells are immortal.



5. Sustained angiogenesis (development of blood supply): Cancer cells are able to orchestrate the creation of new blood vessels to supply them with the oxygen and nutrients they need to grow.

6. Ability to metastasize: Cancer cells can spread to other sites in the body where space, oxygen, and nutrients are more plentiful.



7. Reprogramming of energy metabolism (known as the Warburg effect): Cancer cells alter their method of energy production and increase their metabolic rate in order to sustain rapid growth.

8. Avoidance of immune destruction: Cancer cells suppress the function of key immune cells, including natural killer (NK) cells, while also evading immune surveillance systems.



9. Tumor-promoting inflammation: Tumors activate an inflammatory response that can increase their access to growth factors and blood supply.

10. Genome instability and mutation: Almost all cancer cells have defects in their ability to repair DNA, allowing the reproduction of mutated cells.

T H E C A N C E R S U R V I V O R ' S
C O U R S E F O R

Thriving through Cancer