



Cancer Stages and Development

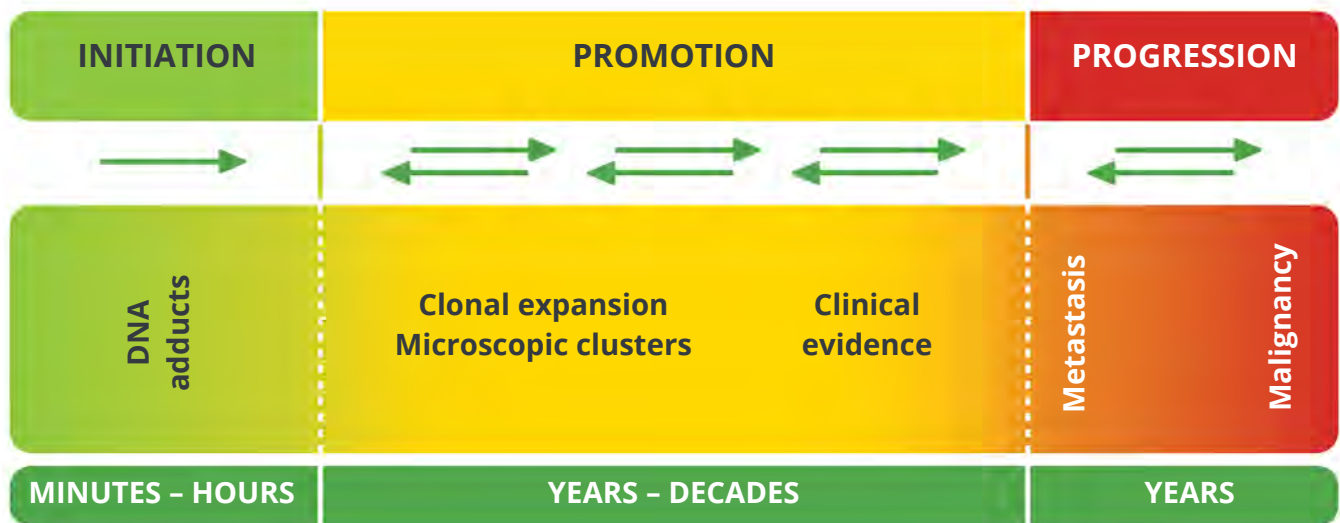
There are three stages of cancer leading up to a typical cancer diagnosis:

- **Initiation** begins the process.
- **Promotion** pushes it along.
- **Progression** describes the cancer as it accelerates and spreads. Once cancer is able to be diagnosed, it is typically in the progression stage.

To use an analogy, these stages are similar to planting a lawn. Initiation is when you put the seeds in the soil, promotion is when the grass starts to grow, and progression is when the grass gets out of control.

Although these stages are divided in this graphic, note the gradual color change that conveys the idea that these stages also share some common features. Cancer development is gradual over time.

Cancer Development Over Time



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Initiation

Initiation occurs within a very short period of time. This is merely the time required for the body's absorption and transport of the carcinogen into the cell, where it is metabolized to a form that tightly binds to DNA, now called a DNA adduct. Although the cell has a highly efficient process of repairing most of this damaged DNA, small amounts may escape repair. If the damaged DNA remains unrepaired for future cell generations, it is considered to be what we call a mutation.

Promotion

Promotion begins with the replication of initiated or mutated cells into clones of these cells and occurs over a longer period of time — years, even decades. If conditions are right, new clones multiply and eventually cluster together to form foci cells that can be seen under a microscope. There is a push-pull process that is controlled by the relative amounts and activities of promoters and anti-promoters. When promoters are more active, the process goes forward toward cancer development. When anti-promoters are more active and prominent, the cancer development regresses.

This concept suggests that if promoters and anti-promoters are identified and controlled, then the cancer development can be kept in a stable state of regression, even if and when mutated cells remain in the tissue.

Progression

Progression is considered to be a foreboding and relatively short period of time compared to the initiation and promotion stages. The progression stage begins with a malignant tumor (cancerous) that grows uncontrollably and spreads locally and/or to distant sites. This spread is called **metastasis**.

Cancer is multi-mechanistic and many variables affect its potential for growth and/or reversal. There is the potential for reversal at all stages of cancer.

