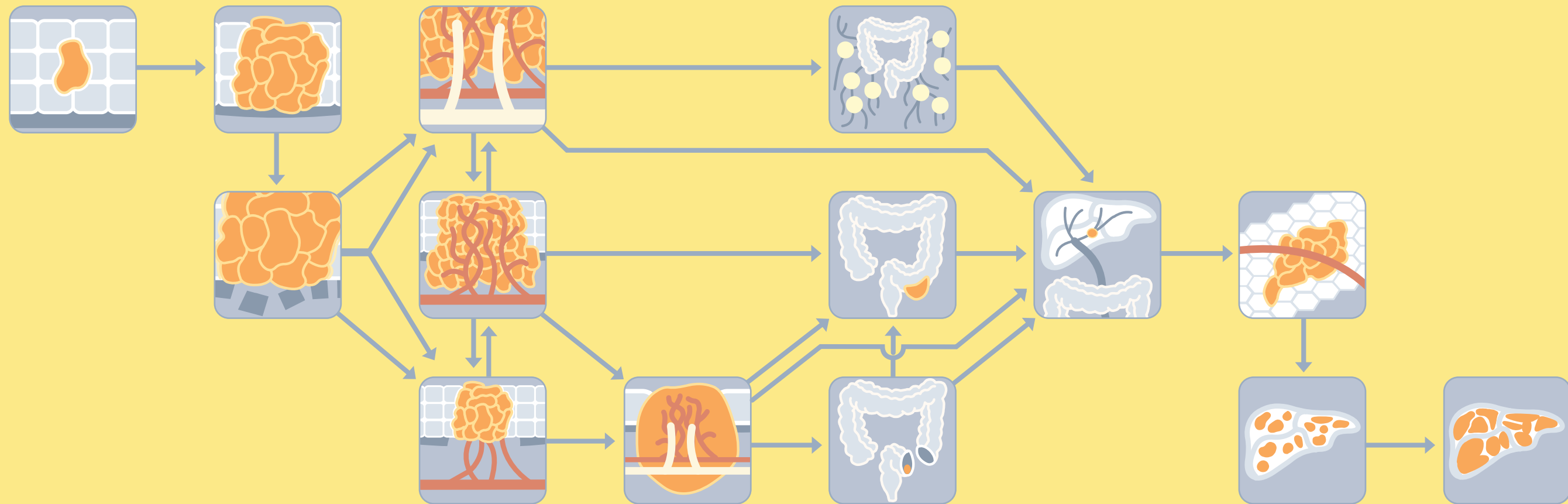


# How cancer grows and spreads

All cancers begin with a single cell that divides uncontrollably and develops into a colony of tumor cells. If this colony recruits its own blood supply ("angiogenesis" in the map below), the tumor will grow at an exponential rate ("tumor expansion"). But it's not this tumor that usually kills; rather, it's metastasis—the spread and growth of tumors to other locations in the body. This map illustrates the paths to metastasis for a carcinoma, the type of cancer that accounts for more than 90 percent of all cancer cases.



**First tumor cell**  
All carcinomas begin with a single cell that, in some small way, has gone wrong.

**Dormant local tumor**  
Without a source of nutrients and oxygen, a tumor can only grow to the size of a pinhead. Most people have small tumors like these that never grow to be harmful.

**Local invasion**  
To cause harm to the body, the tumor cells need to escape through a tightly woven mesh of protein called the basement membrane.

**Lymphangiogenesis**  
Researchers have recently found that, in addition to blood vessels, tumors can recruit new lymph vessels.

**Tumor expansion**  
Now with its own blood supply, the tumor has the potential to grow rapidly.

**Angiogenesis**  
Once the tumor cells rupture the basement membrane, the door is open for angiogenesis—the formation of blood vessels.

**Local primary tumor**  
Sometimes a tumor is encapsulated, which keeps it from spreading into the surrounding tissue. It is still possible, however, for individual tumor cells to escape via the vessels that have grown into the tumor.

**Travel to regional lymph nodes**  
The spread of cancer cells to lymph nodes shows that a cancer has moved outside of the original site.

**Local invasion outside organ**  
The tumor spreads beyond the outer edge of the organ and infiltrates some of the tissue surrounding the organ.

**Local invasion inside organ**  
Sometimes a cancer can invade and even digest the tissue of the organ itself.

**Single cell metastases**  
Some of the tumor cells that make their way into the bloodstream exit the bloodstream and take residence in distant locations.

**Micro metastasis (dormant)**  
Of the many single-celled metastases that establish themselves, some may begin to grow into small colonies.

**Macro metastasis (active)**  
If a micro metastasis is able to trigger angiogenesis, the tumor will expand. There can be many macrometastases within an organ.

**Organ failure**  
If the metastases grow to be the size of pinheads, the invaded organ can usually still function, but if they all grow to be the size of peas or grapes, there may be more cancer cells than organ cells. At this point, the cancer has taken over and shuts down the function of the organ.