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***Section-2***

*ANGIOGENESIS:*

Angiogenesis is a normal and vital process in growth and development, as well as in [wound healing](https://en.wikipedia.org/wiki/Wound_healing) and in the formation of [granulation tissue](https://en.wikipedia.org/wiki/Granulation_tissue). However, it is also a fundamental step in the transition of [tumors](https://en.wikipedia.org/wiki/Tumor) from a benign state to a [malignant](https://en.wikipedia.org/wiki/Malignant) one, leading to the use of [angiogenesis inhibitors](https://en.wikipedia.org/wiki/Angiogenesis_inhibitor) in the treatment of [cancer](https://en.wikipedia.org/wiki/Cancer). The essential role of angiogenesis in tumor growth was first proposed in 1971 by [Judah Folkman](https://en.wikipedia.org/wiki/Judah_Folkman), who described tumors as "hot and bloody, illustrating that, at least for many tumor types, flush [perfusion](https://en.wikipedia.org/wiki/Perfusion) and even [hyperemia](https://en.wikipedia.org/wiki/Hyperaemia) are characteristic.

*TYPES*

*1-Sprouting Angiogenesis:*

Sprouting angiogenesis was the first identified form of angiogenesis and because of this, it is much more understood than intussusceptive angiogenesis. It occurs in several well-characterized stages. The initial signal comes from tissue areas that are devoid of vasculature. The hypoxia that is noted in these areas causes the tissues to demand the presence of nutrients and oxygen that will allow the tissue to carry out metabolic activities.It is markedly different from splitting angiogenesis because it forms entirely new vessels as opposed to splitting existing vessels.

*2-Intussusceptive Angiogenesis:*

[Intussusceptive angiogenesis](https://en.wikipedia.org/wiki/Intussusceptive_angiogenesis), also known as *splitting angiogenesis*, is the formation of a new blood vessel by splitting an existing blood vessel into two.

Intussusception was first observed in [neonatal](https://en.wikipedia.org/wiki/Neonatal) rats. In this type of vessel formation, the capillary wall extends into the [lumen](https://en.wikipedia.org/wiki/Lumen_(anatomy)) to split a single vessel in two. There are four phases of intussusceptive angiogenesis. Intussusception is important because it is a reorganization of existing cells. It allows a vast increase in the number of [capillaries](https://en.wikipedia.org/wiki/Capillaries) without a corresponding increase in the number of [endothelial cells](https://en.wikipedia.org/wiki/Endothelial_cell). This is especially important in embryonic development as there are not enough resources to create a rich [microvasculature](https://en.wikipedia.org/wiki/Microcirculation) with new cells every time a new vessel develops.

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*VASCULOGENESIS:*

is the differentiation of endothelial cells from

progenitor cells during blood vessel development and the denovo formation of blood vessels and tubes.

**Vasculogenesis** is the process of [blood vessel](https://en.wikipedia.org/wiki/Blood_vessel) formation in the [embryo](https://en.wikipedia.org/wiki/Embryo), occurring by a [*de novo*](https://en.wikipedia.org/wiki/De_novo_synthesis) production of [endothelial cells](https://en.wikipedia.org/wiki/Endothelial_cell). It is sometimes paired with [angiogenesis](https://en.wikipedia.org/wiki/Angiogenesis), as the first stage of the formation of the vascular network, closely followed by angiogenesis

*Process:*

In the [sense](https://en.wikipedia.org/wiki/Word_sense) distinguished from [angiogenesis](https://en.wikipedia.org/wiki/Angiogenesis), vasculogenesis is different in one aspect: whereas angiogenesis is the formation of new blood vessels from pre-existing ones, vasculogenesis is the formation of new blood vessels, in blood islands, when there are no pre-existing ones. For example, if a [monolayer](https://en.wikipedia.org/wiki/Monolayer) of [endothelial cells](https://en.wikipedia.org/wiki/Endothelial_cells) begins sprouting to form [capillaries](https://en.wikipedia.org/wiki/Capillary), angiogenesis is occurring. Vasculogenesis, in contrast, is when endothelial precursor cells ([angioblasts](https://en.wikipedia.org/wiki/Angioblast" \o "Angioblast)) migrate and differentiate in response to local cues (such as growth factors and extracellular matrices) to form new blood vessels. These vascular trees are then pruned and extended through angiogenesis.

*Occurences:*

Vasculogenesis occurs during embryologic [development of the circulatory system](https://en.wikipedia.org/wiki/Development_of_the_circulatory_system). Specifically, around blood islands, which first arise in the mesoderm of the yolk sac at 3 weeks of development.

Vasculogenesis can also occur in the adult organism from circulating [endothelial progenitor cells](https://en.wikipedia.org/wiki/Endothelial_progenitor_cell) (derivatives of stem cells) able to contribute, albeit to varying degrees, to neovascularization. Examples of where vasculogenesis can occur in adults are:

* [Tumor](https://en.wikipedia.org/wiki/Tumor) growth.
* [Revascularization](https://en.wikipedia.org/wiki/Revascularization) or [neovascularization](https://en.wikipedia.org/wiki/Neovascularization" \o "Neovascularization) after [trauma](https://en.wikipedia.org/wiki/Major_trauma), for example, after [cardiac ischemia](https://en.wikipedia.org/wiki/Coronary_artery_disease) or [retinal ischemia](https://en.wikipedia.org/wiki/Ocular_ischemic_syndrome)
* [Endometriosis](https://en.wikipedia.org/wiki/Endometriosis) - It appears that up to 37% of the microvascular endothelium of the ectopic endometrial tissue originates from [endothelial progenitor cells](https://en.wikipedia.org/wiki/Endothelial_progenitor_cell).

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