Difference Between Coagulative and Liquefactive Necrosis

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Key Difference – Coagulative vs Liquefactive Necrosis

In the context of cell lysis, necrosis is a phenomenon of cell injury that results in autolysis, the premature death of different cells in tissues. This can occur due to external factors such as traumatic conditions to the cell, toxins, and infection. These factors cause the uncontrollable digestion of different components of the cell. Necrosis does not follow the signaling pathway of natural apoptosis. Cellular death due to necrosis occurs through the activation of different receptors that cause the degeneration of cell membranes; this causes the release of different products of cell death into the extracellular space. This results in an inflammatory response that causes the leucocytes and phagocytes to eliminate the lysed and dead cells through phagocytosis. If necrosis is untreated, it results in the buildup of dead tissue and cell debris near the site of cell death. Necrosis can be classified into many different types. Coagulative necrosis and Liquefactive necrosis are two main types if necrosis. **In coagulative necrosis, the degeneration of protein fibers results in the built-up semi-solid debris of dead tissue and this is considered as an acute type of necrosis. Liquefactive necrosis, a type of chronic necrosis, results in the digestion of dead tissue debris into a liquid form which is then removed by macrophages.** This is the key difference between Coagulative and Liquefactive Necrosis.

What is Coagulative Necrosis?

Coagulative necrosis occurs typically due to infarction or ischemia, primarily in tissues of heart, kidney and adrenal glands. External causative factors for coagulative necrosis are trauma, different types of toxins and also due to various chronic and acute immune responses. Hypoxic conditions cause localized cell death. Coagulative necrosis is an acute type of necrosis which causes the degeneration of protein fibers, resulting in transforming albumin into an opaque firm structure which ends up in semi-solid debris. It also denatures the structural proteins which result in the inhibition of proteolysis activity. Due to the above reason, the coagulated form or semi-solid form is developed. The regeneration process only occurs if adequate amounts of viable cells are present around the necrotic region. Through high temperature, coagulative necrosis could be induced and this theory is used as a treatment for cancer cells.

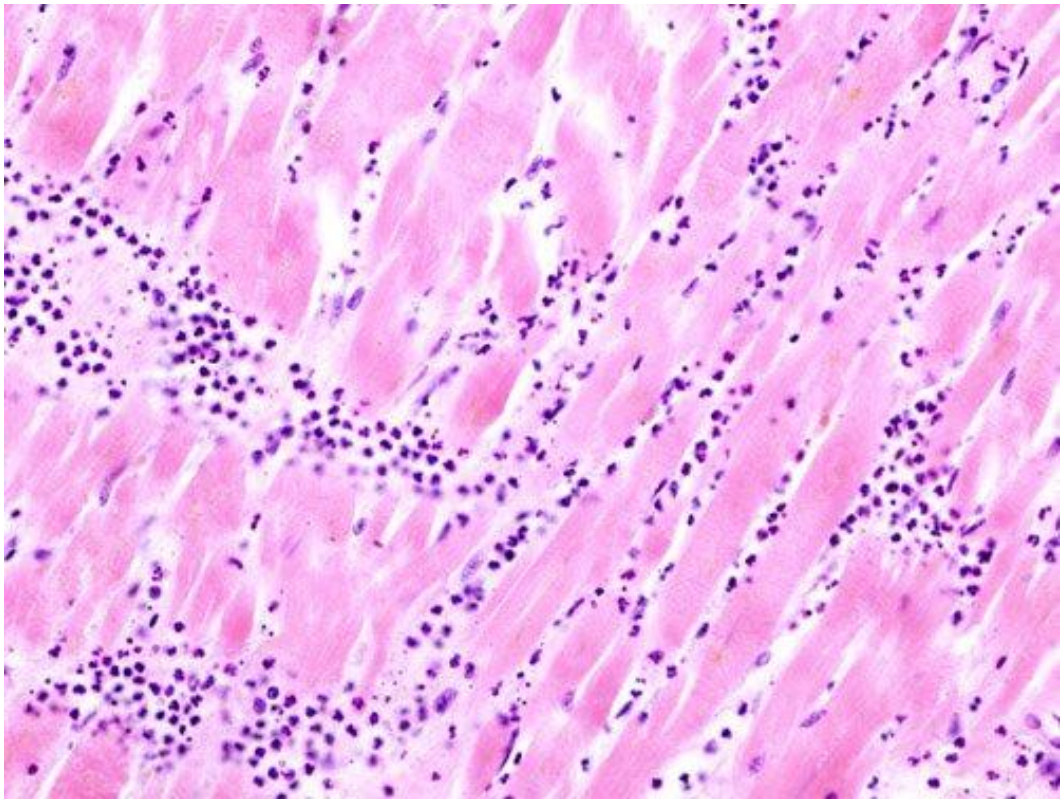

Figure 01: Coagulative Necrosis

In the context of pathology, coagulative necrosis macroscopically appears as a pale segment of tissue which is highlighted by the surrounding tissues which are highly vascularized. The necrotic tissue may later change into red due to inflammation. Regeneration can be achieved by the surrounding cells if an adequate number of well-vascularized cells are present. Microscopically necrotic cells are visible with structural damage and no nucleus once it is stained with haematoxylin and eosin stain.

What is Liquefactive Necrosis?

In liquefactive necrosis, dead tissue debris is digested into a liquid mass. This is usually associated with different infections, both fungal and bacterial. Once a particular tissue undergoes liquefactive necrosis due to hydrolytic enzymes, the infected tissue gets completely digested. This result in the formation of a lesion which contains pus, a thick opaque liquid which is produced by infected cells. Once the cell debris is removed by WBC (white blood cells) a fluid-filled cavity is left. In the central nervous system, the brain cell death due to hypoxia results in liquefactive necrosis where the release of digestive enzymes by the lysosomes converts the infected tissues into pus. The neurons consist higher amounts of lysosomes, which results in tissue liquefaction. This process cannot be initiated due to a stimulus of bacterial infection. The necrotic area will be softened and consists necrotic tissue debris with liquefied centre. This region will be encysted with closed sac which will act as a wall. This phenomenon can

take place in other organs including the lung, which affects the lung tissues forming cavities. The cavities are more than 2cm long. Liquefactive necrosis is less fatal when compared with other types of necrosis processes since it liquefies.

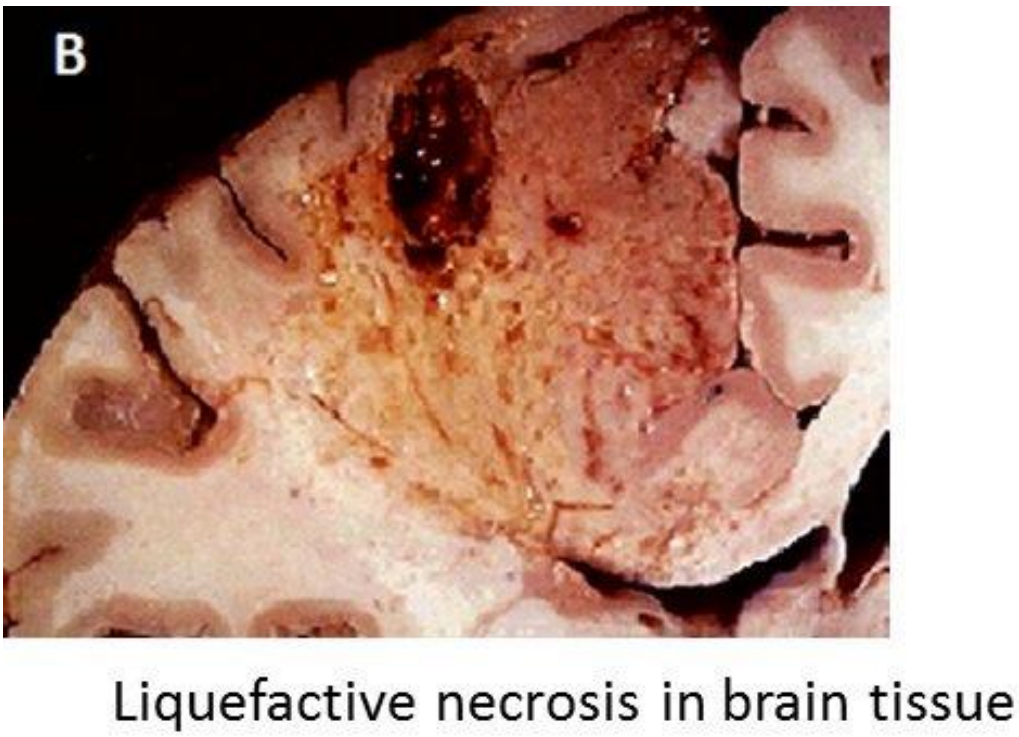

Figure 02: Liquefactive necrosis

What are the similarities between Coagulative and Liquefactive Necrosis?

- Both processes are involved in autolysis of cells.

What is the difference between Coagulative and Liquefactive Necrosis?

Coagulative vs Liquefactive Necrosis	
Coagulative necrosis is a type of accidental cell death typically caused by ischemia or infarction.	Liquefactive necrosis is a type of necrosis which results in a transformation of the tissue into a liquid viscous mass.
Effect	
Coagulative necrosis will result in the development of a semi-solid (coagulated) debris due to degeneration of proteins fibers.	Liquefactive necrosis will digest necrotic tissue into liquid form, pus.

Type of Necrosis	
Coagulative necrosis is chronic.	Liquefactive necrosis is acute.

Summary – Coagulative vs Liquefactive Necrosis

Necrosis occurs due to cell damage which results in autolysis of cells, i.e., unprogrammed cell death. Coagulative necrosis and liquefactive necrosis are two important types of necrosis. In coagulative necrosis, necrotic tissue will develop semi-solid debris due to the degeneration of protein fibers. In liquefactive necrosis, the necrotic tissue is digested into a form of liquid. This is the basic difference between coagulative and liquefactive necrosis.

Reference:

1.Golstein, P, and G Kroemer. "Cell death by necrosis: towards a molecular definition." Trends in biochemical sciences., U.S. National Library of Medicine, Jan. 2007, Available here. Accessed 14 Sept. 2017.
2. "What is Necrosis" Study.com, Available here. Accessed 14 Sept. 2017.

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APA: Difference Between Coagulative and Liquefactive Necrosis. (2017, September 25). Retrieved (date), from http://www.differencebetween.com/ difference-between-coagulative-and-vs-liquefactive-necrosis/

MLA: " Difference Between Coagulative and Liquefactive Necrosis" Difference Between.Com. 25. September 2017. Web.

Chicago: " Difference Between Coagulative and Liquefactive Necrosis." Difference Between.Com. http://www.differencebetween.com/ difference-between-coagulative-and-vs-liquefactive-necrosis/ (accessed [date]).