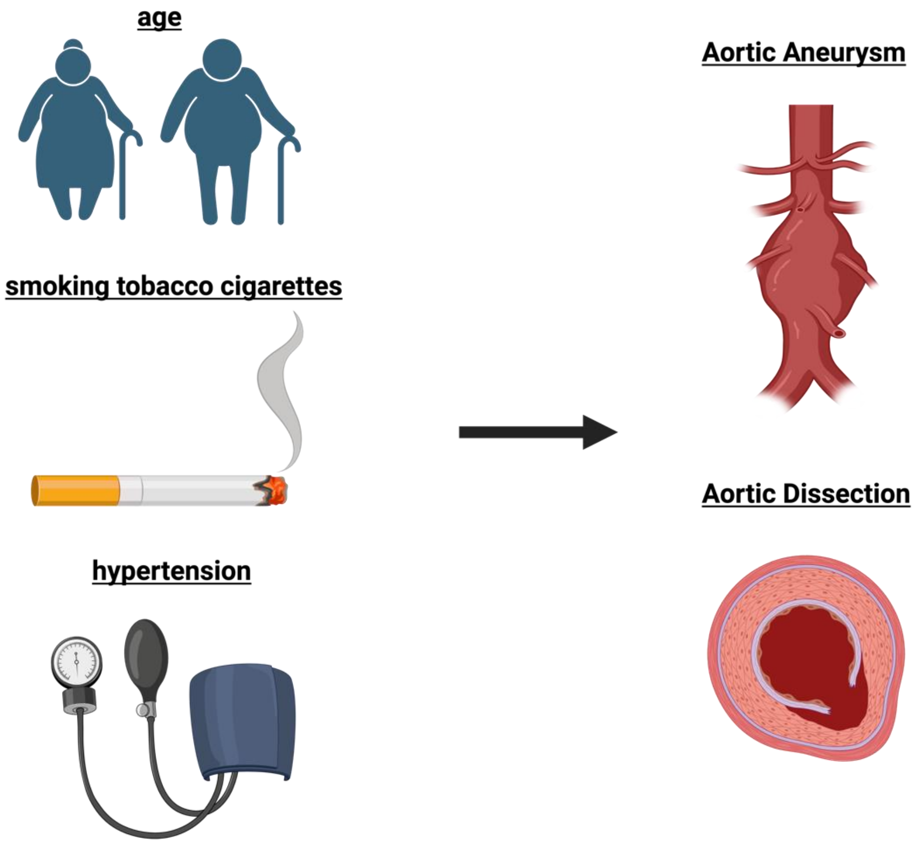
Risk factor in aortic diseases:

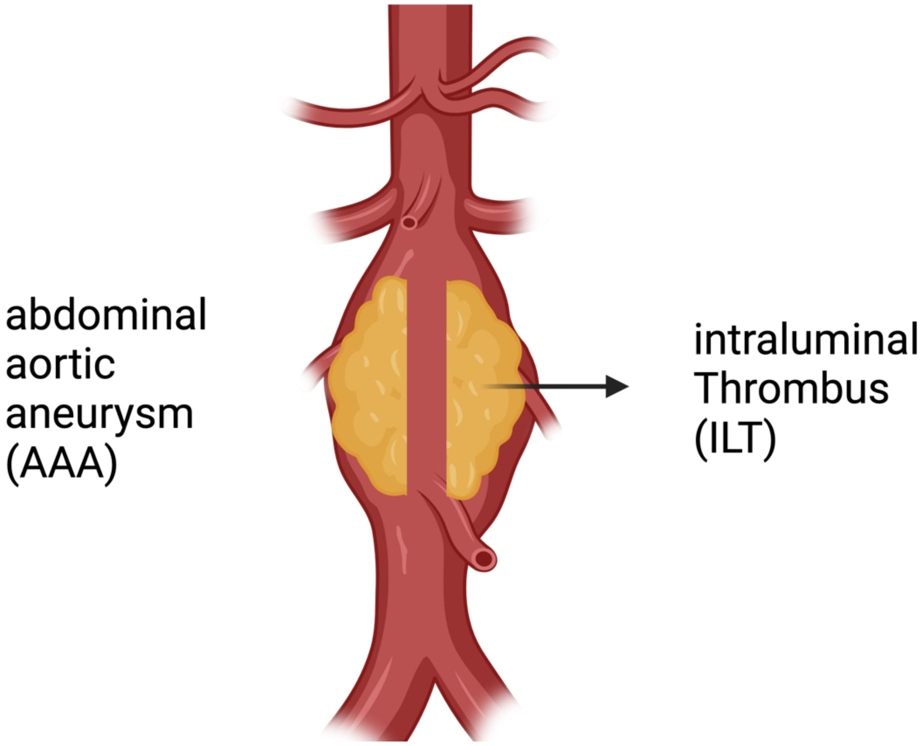
Specific risk factors have been established for both abdominal aortic aneurysm (AAA) and aortic dissection (AD). These risk factors include smoking conventional tobacco cigarettes, age, gender, and genetic and morphologic influences. However, the details of how these risk factors and their interactions drive the development and progression of aortic disease have not been fully elucidated to date. The Aortic Lesions Working Group aims to further this understanding and to ultimately increase patient benefit through possible prevention strategies and interventions.



Age, cigarette smoking, and hypertension are epidemiologically recognized risk factors for the development of aortic disease. However, the exact mechanism of how these risk factors influence or trigger the development of aortic diseases such as abdominal aortic aneurysm (AAA) and or aortic dissection (AD) is not yet fully understood. The Aortic Lesions Group is working to understand the exact pathomechanism and the interaction of risk factors in the pathogenesis. (Created with BioRender)

ILT in AAA

Intraluminal thrombus (ILT) is a disease-specific characteristic of abdominal aortic aneurysm (AAA). A prerequisite for its formation is the activation of platelets, which provides a possible therapeutic target for this disease. The Aortic Lesions Research Group aims to clarify mechanistically the role of ILT and to derive possible therapeutic intervention strategies. Of particular interest is the cellular interplay that enables the progression of ILT and thus has disease-specific value.



Intraluminal thrombus (ILT) is present in the majority of patients with abdominal aortic aneurysm (AAA). It represents a biologically active compartment that could be destructive to the underlying AAA wall. From a biomechanical point of view, the ILT appears to be more stabilizing. Its role in pathogenesis has not yet been fully elucidated. The Aortic Lesions Research Group is trying to clarify the role of ILT in pathogenesis in clinical and experimental approaches. (Created with BioRender).

Senescence in aortic diseases:

Senescence is the natural process of aging in organisms. It is a complex and gradual biological phenomenon that involves a progressive decline in various physiological functions, and cellular processes. Senescence can manifest at various levels, including cellular, tissue, organ, and whole-organism levels. Cellular Senescence of cell types that are involved in AAA and AD is a hallmark in both diseases. It is a potentially reversible process, which makes it particularly interesting for aortic disease research. The Aortic Lesions Research Group is interested in understanding the mechanism of aortic senescence in different settings and tries to derive possible therapeutic approaches.

Normal cell Senescent cell

Senescent cells are metabolically active, meaning they are alive and can perform certain cellular functions, but they are no longer able to contribute to tissue growth or repair. Cellular senescence can be triggered by a variety of factors. Senescence is thought to be a protective mechanism that prevents damaged cells from continuing to divide and potentially becoming cancerous. By entering a state of senescence, these cells are essentially taken out of circulation and prevented from causing harm. Senescence however is a process that is potentially reversible. The Aortic Lesions Research Group is interested in this reversibility potential and seeks to exploit it for potential therapeutic approaches for AAA disease. (Created with BioRender).

Outcome after fEVAR and bEVAR

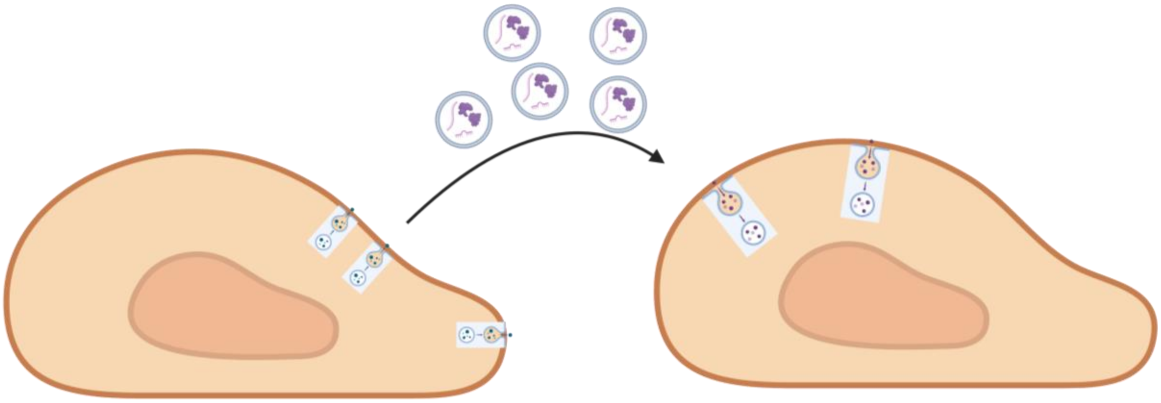
In a clinical oriented research approach the outcome after complex endovascular treatment of patients with implantation of a fenestrated or fenestrated aortic prosthesis will be investigated. Novel endovascular procedures and materials are intended to simplify the procedures and are being researched by the Aortic Lesions Working Group. Optimization of drug management after complex endovascular therapies is also a subject of scientific investigation.

Exosomes in aortic diseases

Exosomes are small extracellular vesicles that play important roles in intercellular communication and various biological processes. These vesicles are secreted by a wide range of cell types, including cells of the immune system, stem cells, and cancer cells, among others. Exosomes contain a variety of molecules, including proteins, nucleic acids (such as RNA and DNA), lipids, and other bioactive molecules.

Exosomes are formed within cells through a process involving the inward budding of the endosomal membrane. This creates intracellular vesicles known as multivesicular bodies (MVBs). When MVBs fuse with the cell's plasma membrane, they release their contents into the extracellular space as exosomes. Exosomes serve as vehicles for transferring information between cells. They can transport molecules like proteins and genetic material from one cell to another, influencing the recipient cell's behavior and function. This communication can be both local and long-distance, and it's thought to be important in various physiological and pathological processes. Exosomes contain a diverse cargo of molecules, including various types of RNA (messenger RNA, microRNA, and other non-coding RNAs), proteins, lipids, and even DNA. The specific cargo carried by exosomes can vary depending on the cell type, physiological conditions, and other factors.

The Aortic Lesions research group aims to further understand the role of exosomes in aortic disease and is investigating this in various experimental approaches.



Exosomes are small, membrane-bound vesicles that are released by cells into the extracellular environment. They play a crucial role in cell-to-cell communication and the transfer of various molecules, such as proteins, nucleic acids (RNA and DNA), lipids, and metabolites, between cells. Exosomes are involved in various physiological processes, including immune response modulation, tissue repair, and development, as well as pathological conditions like cancer and neurodegenerative diseases. The role of exosomes in abdominal aortic aneurysm (AAA) remains yet to be investigated. The Research Group Aortic Lesions aims to understand the role of exosomes in the pathogenesis of AAA disease. (Created with BioRender).