Klinik III für Innere Medizin - Allgemeine und interventionelle Kardiologie, Elektrophysiologie, Angiologie, Pneumologie und internistische Intensivmedizin

DFG-funded Collaborative Research Center SFB TRR259

Collaborative Research Center
Aortic Disease

Rheinische Friedrich-Wilhemls-Universität Bonn
University of Cologne
Heinrich-Heine-Universität Düsseldorf

Spokesperson Bonn:
Prof. Georg Nickenig, MD (chefsekretariat.prof.nickenig@ukbonn.de)

Scientific Coordinator Bonn:
Marika Enders, PhD (menders@uni-koeln.de)

Deputy Spokesperson Cologne:
Prof. Stephan Baldus, MD (stephan.baldus@uk-koeln.de)

Deputy Scientific Coordinator Cologne:
Monika Schlosser, PhD (monika.schlosser@uk-koeln.de)

Deputy Spokesperson Düsseldorf:
Prof. Malte Kelm, MD (birgit.heller@med.uni-duesseldorf.de)

Deputy Scientific Coordinator Düsseldorf:
Stefanie Kluge, PhD (wissenschaftsmanagement.kardio@med.uni-duesseldorf.de)

Kurzbeschreibung

The aorta is composed of the aortic valve, the ascending aorta with its root and arch, as well as the thoracic and abdominal sections of the descending aorta. It connects the heart with the peripheral circulation and organs, and it is involved in the complex regulation of hemodynamics. Although each section of the aorta has a unique composition, is exposed to distinct mechanical forces, and therefore, develops specific disease phenotypes, different aortic disorders share some of the same pathophysiological mechanisms: biological, chemical, and mechanical stressors promote dysfunction of the aortic endothelial lining, recruitment and activation of immune cells, and subsequent modification of interstitial cell metabolism. This local proinflammatory milieu stimulates an increased and faulty deposition of extracellular matrix, posttranslational matrix remodeling, and premature calcification as a critical prerequisite for aortic wall or valve injury. There are two apparent sources for these effects: resident factors and circulating, non-resident factors. Within the aorta itself, resident effectors include oxidative and mechanical stress, as well as modulation of endothelial and interstitial cells and the extracellular matrix. In addition, there are a number of non-resident factors that contribute to aortic disease, including immune cells, platelets, fat cells, and various signaling molecules. An individual’s susceptibility for developing disease is largely determined by a, yet unclear, genetic predisposition. While aortic diseases occur frequently, are associated with high mortality, and often require hazardous interventions, the distinct pathologies of the aortic system have never been systematically investigated. The interconnection and mutual impact of aortic diseases on each other within the complex aortic system remains obscured.

With this initiative, we aim to address the underlying resident and non-resident molecular and cellular mechanisms of aortic disease in a holistic manner, with a particular focus on aortic valve stenosis, aortic aneurysm, and aortic dissection. Prospectively, we envision identifying novel pharmacological, interventional, and surgical targets for diagnostic, preventive, and therapeutic strategies within the frame of translational and clinical studies.

Clustered along the Rhine River, the three universities involved in the Aortic Disease CRC/Transregio proposal are bringing together basic and clinical science experts, and will fill a gap that currently exists in cardiovascular research. This collaboration has positioned the three institutions perfectly to investigate the causes of aortic disease, and hopefully in further funding periods, to begin to move towards new treatment regimens.

Involved Institutions:

1. Rheinische Friedrich-Wilhelms-Universität Bonn
2. Heinrich Heine Universität Düsseldorf
3. Universität zu Köln