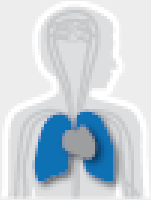
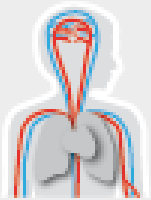


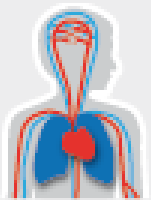
Heart Failure & Arrhythmias



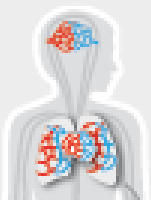
Pulmonary Hypertension
& Thrombosis



Atherosclerosis
& Ischemic Syndromes



Diabetes & Metabolism



Microcirculation

Focus of research group (I)

Name PI: Coert Zuurbier; staff member Nina Hauck

Department, UMC: Anesthesiologie

Size of research group: 2 PhD, 1 technician, 2 senior researcher and 2-4 MSc/BSc students

Mission:

Understanding how Diabetes increases CardioVascular Disease

Vision:

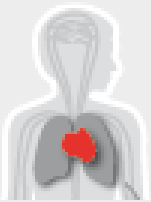
Disturbances in cardiac ion homeostasis with Diabetes results in CVD through \uparrow oxidative stress and \downarrow mitochondrial function

Aims:

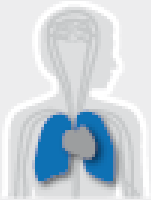
Unraveling the mechanism along which SGLT2 inhibitors work, *the first effective diabetic drugs showing reduced CVD events.*

Approach: studying drugs effects and mechanism at the level of:

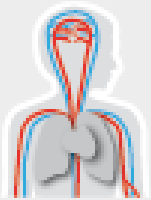
- cardiomyocyte
- endothelium cell
- intact heart
- intact animal
- human tissue



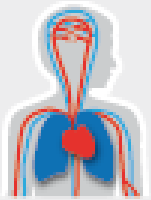
Heart Failure & Arrhythmias



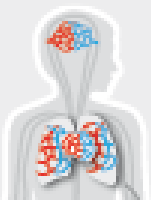
Pulmonary Hypertension
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Diabetes & Metabolism



Microcirculation

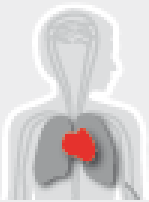
Focus of research group (II)

Current expertise

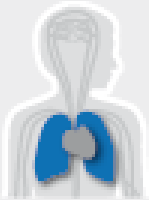
- Empa/Dapa/Canagliflozin lowers $\text{Na}^+/\text{Ca}^{2+}$ in cardiomyocytes; increase mitochondrial Ca^{2+} ; impair NHE.
Baartscheer; Uthman Diabetolog. '17 (top cited paper); '18
- *Empa delays ischemic contracture in isolated heart*
Uthman et al Cardiovasc Res (in revision)
- *Empa has minor effects on endothelial cells (HUVEC/CAEC)*

Current funding

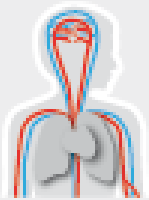
- European Foundation Study Diabetes
- Chinese Scholarship Council
- Alliance Vumc-AMC (OOTB)



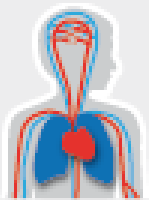
Heart Failure & Arrhythmias



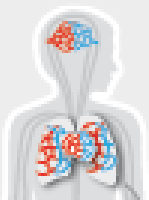
Pulmonary Hypertension
& Thrombosis



Atherosclerosis
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Diabetes & Metabolism



Microcirculation

Future plans

Short term (1-2 year) plan

Plan:

SGLT2i effect on T2 isolated diabetic heart: function + metabolism

SGLT2i effect on heart failure in SGLT2 KO mice

SGLT2i effect on endothelial cells

Necessary infrastructure:

Isolated heart platforms, metabolomics ^{13}C heart, in vivo mouse heart function/metabolism (small animal MRI/PET), animal facility

Long term (>2 year) plan

Plan: if proven correct, extend concepts, therapy and research to heart failure (HFpEF, HFrEF, HCM) and T2DM cardiac dysfunction

Necessary infrastructure:

Collaboration in ACS:

Clinical Anesthesiology, AMC (Hermanides) Clinical application/evaluation SGLT2i

Exp. Cardiology, AMC (Baartscheer, Coronel) Ions in cardiomyocytes

Lab Gen Metab Dis, AMC (Houtkooper) ^{13}C metabolism intact heart

Physiology, Vumc (van der Velden, Wijnker) human engineered heart tissue Biomed

Eng Physics, AMC (Strijkers, Wust) small animal MRI/PET function/energetics