Hypertension, obesity, and chronic kidney disease represent major health burdens with increasing prevalence world-wide. Using state of the art methodology to unravel the contribution of relevant pathways and their interaction including the sympathetic nervous system, the L-arginine / NO pathway, and the renin-angiotensin-aldosterone system in the disease process, our clinical investigation focus on developing novel and more effective treatment strategies for these conditions.

Research Brief
Approximately two thirds of all strokes and half of all coronary disease world-wide can be attributed to non-optimal blood pressure (hypertension). This represents ≈7 million deaths and 64 million disability-adjusted life years each year, making hypertension the biggest killer globally. The team of the Hypertension & Kidney Disease Laboratory is devoted to unravel the pathways and mechanisms responsible for elevated blood pressure in order to develop novel therapeutic strategies to curb the global burden of hypertension. As an ESH (European Society of Hypertension) accredited Hypertension Excellence Centre we work on three major themes including:

1. Hypertension resistant to conventional drug treatment
2. Hypertension related to kidney disease
3. Obesity related hypertension

The lab has particular focus on the role of the sympathetic nervous system in these scenarios and by combining our state-of-the-art technologies with genetic, protein based and biochemical testing from human blood and tissue samples we are uniquely positioned to undertake genuine translational research.

Methodologies
- Assessment of sympathetic nerve activity (regional noradrenaline spillover, microneurography (multi- and single unit MSNA), baro- and chemoreflex sensitivity, forearm vein biopsies, tilt-testing)
- Biochemical techniques - HPLC, ELISA, RIA, Western blots, SNP analysis
- Psychometric evaluation (patient interviews for depression, anxiety etc)
- Catheter-based renal denervation (humans and large animals)

Selected Publications
Cardiovascular events are the major cause of morbidity and mortality in patients with hypertension and renal failure. We are examining the role of the sympathetic nervous system and its contribution to the development of hypertension, the cardiovascular complications, and the progression of renal failure in these patients.

Renal sympathetic hyperactivity contributes substantially to hypertension. In a novel catheter based approach using radiofrequency energy we were able to demonstrate both the safety and the efficacy of the procedure resulting in substantial and sustained reductions in BP, without significant adverse events, in patients with resistant hypertension. This is likely to revolutionize the treatment of this high risk patient cohort.

Around 70% of all hypertension is directly attributable to overweight and obesity. The pathophysiological mechanisms linking increased body weight to the development of hypertension are complex and involve many metabolic and cardiovascular control systems. Increased sympathetic nervous system activity is already evident in very young overweight and obese subjects and is associated with early signs of target organ damage such as impaired endothelial function and glomerular hyperfiltration.