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The overall goal of my current research is to understand the mechanisms involved in growth and adaptation of cardiac coronary vessels in health and disease. My approaches include the use of *in vivo* and *in vitro* experimental models, immunohistochemistry, fluorescence microscopy and quantitative image analysis.

One area of my investigation concerns angiogenesis and arteriogenesis in developing hearts (1, 2, 3, 4). Using *in ovo* and organ/tissue culture (heart explants) models, my experiments address the role of neurogenic peptides (vasoactive intestinal peptide and neuropeptide Y) during embryonic and fetal development of the coronary arterial system (3). The results of this study may affect our understanding of various congenital anomalies of human coronary arteries.

A second area of investigation concerns coronary vessel growth and remodeling in adult hearts subjected to experimental myocardial infarction (5, 6, 7). This study includes non-invasive therapeutic interventions that affect growth and remodeling of coronary resistance vessels to restore compromised blood perfusion within the survived myocardium. These interventions are regarded as alternatives to gene therapy and the direct application of growth factors to the post-infarcted heart.

Representative Publications:

1. **Dedkov EI**, Thomas MT, Sonka M, Yang F, Chittenden TW, Rhodes JM, Simons M, Ritman EL, Tomanek RJ. Synectin/Syndecan-4 regulates coronary arteriolar growth during development. *Developmental Dynamics* 2007; 236: 2004-2010. [Link](#)
2. Chittenden TW, Claes F, Lanahan AA, Autiero M, Palac RT, Tkachenko EV, Elfenbein A, Ruiz de Almodovar C, **Dedkov E**, Tomanek R, Li W, Westmore M, Singh JP, Horowitz A, Mulligan-Kehoe MJ, Moodie KL, Zhuang ZW, Carmeliet P, Simons M. Selective regulation of arterial branching morphogenesis by synectin. *Developmental Cell* 2006; 10: 783-795. [Link](#)
3. **Dedkov EI**, Christensen LP, Tomanek RJ. Vasoactive intestinal polypeptide receptors (VIP1 and VIP2) are morphogenic modulators of embryonic coronary vessel tube formation. *FASEB Journal* 2006; 20 (4) Part I: A440.
4. Tomanek RJ, Hansen H, **Dedkov EI**. Vascular patterning of the quail coronary system during development. *Anatomical Record Part A: Discoveries in Molecular, Cellular, and Evolutionary Biology* 2006; 288A: 989-999. [Link](#)
5. **Dedkov EI**, Zheng W, Christensen LP, Weiss RM, Mahlberg-Gaudin F, Tomanek RJ. Preservation of coronary reserve by ivabradine-induced reduction in heart rate in infarcted rats is associated with decrease in perivascular collagen. *American Journal of Physiology – Heart Circulatory Physiology* 2007; 293: H590-H598. [Link](#)
6. **Dedkov EI**, Zheng W, Tomanek RJ. Compensatory growth of coronary arterioles in post-infarcted heart: regional differences in DNA synthesis and growth factor/receptor expression patterns. *American Journal of Physiology – Heart Circulatory Physiology* 2006; 291: H1686-H1693. [Link](#)
7. **Dedkov EI**, Christensen LP, Weiss RM, Tomanek RJ. Reduction of heart rate by chronic β 1-adrenoceptor blockade promotes growth of arterioles and preserves coronary perfusion reserve in post-infarcted heart. *American Journal of Physiology – Heart Circulatory Physiology* 2005; 288: H2684-H2693. [Link](#)