

## ATTILA TÓTH



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## RESEARCH AREA

We deal with three areas of research in our laboratory. (1) High blood pressure affects one in three adults, but the cause is unknown in 90% of cases. The diameter of the blood vessels determines the tissue blood supply and blood pressure. We investigate the mechanisms of regulation of the vascular diameter, with particular reference to mechanisms that depend on temperature-dependent receptors and angiotensin peptides. (2) Heart failure is a high-mortality disease that is unfortunately common in Hungary. In our research, we investigate the mechanisms leading to heart failure and the mechanisms of action of new experimental drugs. (3) Cardiovascular disease is the leading cause of death. With proper medication, survival can be significantly improved. Nevertheless, less than half of patients are taking their medications properly. In addition, setting the right dose of drug is difficult and time consuming. In our research, we develop methods that are suitable for measuring the biochemical efficacy of drugs. This may make it possible to determine the optimal dose for a given patient after a simple blood draw.

## TECHNIQUES AVAILABLE IN THE LAB

- (1) Vascular measurements: artery isolation; cannulation or wire fixation; then measurement of vascular function by diameter change (based on a microscopic image) or determination of contractile force.
- (2) Examination of myocardial contractility: simultaneous measurement of the contraction and intracellular  $Ca^{2+}$  concentration of isolated myocardial cells; monitoring of myocardial function in anesthetized animals by echocardiography.
- (3) Biomarker research: enzyme activity measurements; separation techniques; ELISA technique; application and programming of a large chemical laboratory analyser (automatic measurements).

## SELECTED PUBLICATIONS

Fagyas, M., Bánhegyi, V., Uri, K., Enyedi, A., Lizanecz, E., Mányiné Siket, I., Mártha, L., Fülöp, G., Radovits, T., Pólos, M., Merkely, B., Kovács, Á., Szilvássy, Z., Ungvári, Z., Édes, I., Csanádi, Z., Boczán, J., Takács, I., Szabó, G., Balla, J., Balla, G., Seferović, P., Papp, Z., **Tóth, A.** (2021) Changes in the SARS-CoV-2 cellular receptor ACE2 levels in cardiovascular patients: a potential biomarker for the stratification of COVID-19 patients. **GeroScience** [Epub ahead of print]

Bánhegyi, V., Enyedi, A., Fülöp, G., Oláh, A., Mányiné Siket, I., Váradi, C., Bottyán, K., Lódi, M., Csongrádi, A., Umar, M., Fagyas, M., Czuriga, D., Édes, I., Pólos, M., Merkely, B., Csanádi, Z., Papp, Z., Szabó, G., Radovits, T., Takács, I., **Tóth, A.** (2021) Human Tissue Angiotensin Converting Enzyme (ACE) Activity Is Regulated by Genetic Polymorphisms, Posttranslational Modifications, Endogenous Inhibitors and Secretion in the Serum, Lungs and Heart. **Cells** **10**: 1708

Fagyas, M., Kertész, A., Mányiné Siket, I., Bánhegyi, V., Kracsó, B., Szegedi, A., Szokol, M., Vajda, G., Rácz, I., Gulyás, H., Szkibák, N., Rácz, V., Csanádi, Z., Papp, Z., **Tóth, A.**, Sipka, S. (2021) Level of the SARS-CoV-2 receptor ACE2 activity is highly elevated in old-aged patients with aortic stenosis: implications for ACE2 as a biomarker for the severity of COVID-19. **GeroScience** **43**: 19-29.

Fülöp, G., Oláh, A., Csípő, T., Kovács, Á., Pórszász, R., Veress, R., Horváth, B., Nagy, L., Bódi, B., Fagyas, M., Helgadottir, S., Bánhegyi, V., Juhász, B., Bombicz, M., Priks, D., Nánási, P., Merkely, B., Édes, I., Csanádi, Z., Papp, Z., Radovits, T., **Tóth, A.** (2021) Omecamtiv mecarbil evokes diastolic dysfunction and leads to periodic electromechanical alternans. **Basic Res Cardiol** **116**: 24

**Tóth, A.**, Fagyas, M., Papp, Z., Édes, I.: **Dilution based inhibition assay.** [szabadalom]