



Akos Koller, MD, PhD, DSc

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Curriculum Vitae

Dr. Akos Koller has started his research work in Hungary after finishing the Semmelweis Medical School in 1969-1975. Then, he started to work on coronary and brain microcirculation with Prof AGB Kovach. He moved from Hungary to the USA in 1982, where he was doing research at the Cerebrovascular Res Center at University of Pennsylvania, with Martin Reivich and Britton Chance on pial microcirculation, regarding the role of adenosine, NADH level/metabolism and spreading depression. He then went to Tucson, Arizona where he learned from Paul C Johnson all topics of classical in vivo microcirculation and engaged in microcirculatory network studies to understand important complexity of microcirculation. Then in 1987, he moved to Valhalla, New York and with the help Gabor Kaley he became an independent scientist.

He has received several NIH and AHA grants which supported his studies on the function of microvessels of various tissues, the newly discovered vasomotor role of endothelium in vivo and the effect of hemodynamic forces in acute and chronic condition on the remodeling of microvascular function in vitro. He was one of the first (if not the first) who discovered in 1989 the role of wall shear stress in eliciting substantial dilation of arterioles, venules and affecting the vasomotion of lymphatic microvessels.

Later he investigated the modulation of the function of endothelium by age, gender, exercise and various diseased conditions. He then in 2011 discovered that increases in flow elicit constrictions in cerebral arteries contributing thereby to the autoregulation of cerebral blood flow and clarified the underlying molecular signaling.

He has published his papers in highly esteemed journals, such as Am J Physiol, Circ Res, Circulation, Cardiovasc Res, J of Pathology, Hypertension, MVR, Microcirculation and JVR. All in all, he has done and doing many excellent works in microcirculation, discovered several new mechanisms and introduced several new techniques.

In addition to basic research, he contributed to clinical research and papers, recently contributed to an ESC guideline on Myocardial Revascularization. In addition, he has trained many young scientists and remained their mentor after obtaining their PhD degrees. With his international research network, he was instrumental to connecting the microcirculatory communities of United States, Europe and Asia.

Total IF: 922.4, Citations: 9969, Hirsch index: 68

Dr. Koller' selected publications:

1. Kovach, A.G.B., E. Dora, S. Szedlacsek and **A. Koller**. Effect of the organic calcium antagonist D-600 on cerebrocortical vascular and redox responses evoked by adenosine, epilepsy, and anoxia. **J. Cereb. Blood Flow Metabol.** 3:51-61, **1983**.
2. **Koller, A.** and G. Kaley. Prostaglandins mediate arteriolar dilation to increase blood flow velocity in skeletal muscle microcirculation. **Circ. Res.** 67:529-534, **1990**.
3. **Koller, A.**, D. Sun and G. Kaley. Role of shear stress and endothelial prostaglandins in flow- and viscosity-induced dilation of arterioles in vitro. **Circ. Res.** 72:1276-1284, **1993**.
4. **Koller, A.** and A. Huang. Impaired nitric oxide-mediated flow-induced dilation in arterioles of spontaneously hypertensive rats. **Circ. Res.** 74 No. 3:416-421, **1994**.
5. **Koller, A.**, A. Huang, D. Sun and G. Kaley. Exercise training augments flow-dependent dilation in rat skeletal muscle arterioles. Role of endothelial nitric oxide and prostaglandins. **Circ. Res.** 76: 544-550, **1995**.
6. **Koller, A.**, and A. Huang. Shear stress-induced dilation is attenuated in skeletal muscle arterioles of hypertensive rats. *Hypertension* 25 (part 2):758-763 1995.
7. Huang, A., D. Sun, G. Kaley and **A. Koller**. Estrogen preserves regulation of shear stress by nitric oxide in arterioles of female hypertensive rats. **Hypertension** 31: 309-314, **1998**.
8. Dörnyei, G., G. Kaley and **A. Koller**. Flow-induced responses in skeletal muscle venules: modulation by nitric oxide and prostaglandins. **Am. J. Physiol.** (Heart and Circ. Physiol.) 44: H831-H836, **1998**.
9. Huang, A., D. Sun, G. Kaley and **A. Koller**. Superoxide released to high intra-arteriolar pressure reduces nitric oxide-mediated shear stress- and agonist-induced dilations. **Circ. Res.** 83: 960-965, **1998**.
10. Huang, A., Sun, D., **Koller, A.**, Kaley, G. 17 β -estradiol restores endothelial nitric oxide release to shear stress in arterioles of male hypertensive rats. **Circulation**, 101:94-100, **2000**.
11. Ungvari Z, Csiszar A, Huang A, Kaminski PM, Wolin MS, **Koller A**. High pressure induces superoxide production in isolated arteries via protein kinase C-dependent activation of NAD(P)H oxidase. **Circulation** 108(10): 1253-1258, **2003**.
12. Ungvari Z., Csiszar A., Kaminski PM., Wolin S., **Koller A**. Chronic high pressure-induced arterial oxidative stress. Involvement of protein kinase C-dependent NAD(P)H oxidase and local renin-angiotensin system. **Am J Pathology**, 165(1): 219-26, **2004**.

13. Bagi Z, Frangos JA, Yeh JC, White CR, Kaley G, **Koller A**. PECAM-1 Mediates NO-dependent dilation of arterioles to high temporal gradients of shear stress. *Arterioscler Thromb Vasc Biol*. 25:1590-1595, **2005**.
14. Bagi Zs., Feher A., Akula K., Labinsky N., Kaley G., **Koller A**. Increased availability of AT1 receptors leads to sustained arterial constriction to angiotensin II in diabetes – role for Rho-kinase activation. *Br J Pharmacol*. Jul; 163(5):1059-68. doi: 10.1111/j.1476-5381.2011.01307. **2011**.
15. Toth, P Rozsa B, Springo Z, Doczi T, **Koller A**. Isolated human and rat cerebral arteries constrict to increases in flow: role of 20-HETE and TP receptors, *J Cereb Blood Flow Metab*. 2011 Oct; 31(10):2096-105. doi: 10.1038/jcbfm.2011.74. Epub May 25. **2011**.
16. Toth P, Csiszar A, Sosnowska D, Tucsek Z, Cseplo P, Springo Z, Tarantini S, Sonntag WE, Ungvari Z, **Koller A**. Treatment with the cytochrome P450 omega-hydroxylase inhibitor HET0016 attenuates cerebrovascular inflammation, oxidative stress and improves vasomotor function in spontaneously hypertensive rats. *Br J Pharmacol*. Apr;168(8):1878-88, **2013**.
17. Toth P, Szarka N, Farkas E, Ezer E, Czeiter E, Amrein K, Ungvari ZI, Hartings JA, Buki A, **Koller A**. Traumatic brain injury-induced autoregulatory dysfunction and spreading depression-related neurovascular uncoupling: pathomechanisms and therapeutic implications. *Am J Physiol Heart Circ Physiol*. Nov 1;311(5):H1118-H1131. **2016**.
18. Badimon L, Bugiardini R, Cenko E, Cubedo J, Dorobantu M, Duncker DJ, Estruch R, Milicic D, Tousoulis D, Vasiljevic Z, Vilahur G, de Wit C, **Koller A**. Position paper of the European Society of Cardiology-working group of coronary pathophysiology and microcirculation: Obesity and Heart Disease. *European Heart Journal* 38:(25) pp. 1951-1958. **2017**.
19. Deng W, Kandhi S, Zhang B, Huang A, **Koller A**, Sun D. Extravascular blood augments myogenic constriction of cerebral arterioles: Implications for hemorrhage-induced vasospasm. *J Am Heart Assoc*. Apr 13;7(8) 2018.
20. Szekeres M, Nádasy GL, Dörnyei G, Szénási A, **Koller A**. Remodeling of wall mechanics and the myogenic mechanism of rat intramural coronary arterioles in response to a short-term daily exercise program: Role of endothelial factors. *J Vasc Res*. 2018;55(2):87-97. **2018**.
21. Szenasi, Annamaria ; Amrein, Krisztina ; Czeiter, Endre ; Szarka, Nikolett ; Toth, Peter ; **Koller, Akos** Molecular Pathomechanisms of Impaired Flow-Induced Constriction of Cerebral Arteries Following Traumatic Brain Injury: A Potential Impact on Cerebral Autoregulation. *INTERNATIONAL JOURNAL OF MOLECULAR SCIENCES* 22 : 12 Paper: 6624 , 12 p. **2021**.
22. **Koller, Akos**. A blow to the head impairs the autoregulation of brain blood flow: Neural consequences. *RESEARCH OUTREACH & p. & , 4 p. 2021*.

23. **Koller, Akos**; Takács, Johanna. Translation of scientific evidence into cardiovascular guidelines. *JBIC EVIDENCE IMPLEMENTATION* 19 : 4 pp. 437-445. , 9 p. **2021**.
24. Jukic, Ivana ; Mihaljevic, Zrinka ; Matic, Anita ; Mihalj, Martina ; Kozina, Natasa ; Selthofer-Relatic, Kristina ; Mihaljevic, Dubravka ; **Koller, Akos** ; Tartaro Bujak, Ivana ; Drenjancevic, Ines. Angiotensin II type 1 receptor is involved in flow-induced vasomotor responses of isolated middle cerebral arteries. Role of oxidative stress. *AMERICAN JOURNAL OF PHYSIOLOGY: HEART AND CIRCULATORY PHYSIOLOGY* 320 : 4 pp. H1609-H1624. , 16 p. **2021**.
25. Alasztics, Bálint; Kovács, Árpád Ferenc ; Molvarec, Attila ; **Koller, Ákos** ; Szabó, Gábor ; Fekete, Nóra ; Buzás, Edit Irén ; Pállinger, Éva ; Rigó, János. Platelet-derived extracellular vesicles may contribute to the hypercoagulable state in preeclampsia. *JOURNAL OF REPRODUCTIVE IMMUNOLOGY* 148 Paper: 103380 , 6 p. **2021**.
26. **Koller, Akos**; Laughlin, M Harold ; Cenko, Edina ; de Wit, Cor ; Tóth, Kálmán ; Bugiardini, Raffaele ; Trifunovits, Danijela ; Vavlukis, Marija ; Manfrini, Olivia ; Lelbach, Adam et al. Functional and structural adaptations of the coronary macro- and microvasculature to regular aerobic exercise by activation of physiological, cellular, and molecular mechanisms: ESC Working Group on Coronary Pathophysiology and Microcirculation position paper. *CARDIOVASCULAR RESEARCH* 118: 2 pp. 357-371., 15 p. **2022**.