

Prof. Nikolaos Stergiopoulos, PhD

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Personal Information

Name: Nikolaos Stergiopoulos

Address: EPFL MED 3 2326, Station 9, CH-1015 Lausanne, Switzerland

Date of Birth: August 29, 1962

Place of Birth: Farsala, Greece

Citizenship: Greek and Swiss

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Google Scholar ID: Nikos Stergiopoulos

Education

- 2000 – MTE, Technology Management Program, IMD Lausanne
- 1990 – PhD in Biomedical Engineering, Iowa State University
- 1987 – MSc in Biomedical Engineering, Iowa State University
- 1986 – Diploma in Mechanical Engineering, National Technical University of Athens

Employment History

2009–present – Full Professor and Director, Laboratory of Hemodynamics and Cardiovascular Technology, EPFL

Research: cardiovascular mechanics and physiology, hemodynamics, vascular mechanobiology, implantable devices

Teaching: Fluid Mechanics (UG), Hemodynamics, Biomechanics, and Medical Technology (PG)

2010–present – Founder and CEO, Rheon Medical S.A.

Startup developing implantable glaucoma drainage devices

2017–present – Founder and Managing Director, Comphy S.A.

Startup developing electrostimulation therapies for erectile dysfunction

2003–2009 – Associate Professor and Director, Laboratory of Hemodynamics and Cardiovascular Technology, EPFL

1998–2007 – Founder and Scientific Director, EndoArt S.A.

Pioneer in telemetric implants for heart disease and obesity (acquired by Allergan in 2007)

1996–2002 – Assistant Professor, EPFL Biomedical Engineering Laboratory

1991–1996 – Research Fellow (Premier Assistant), EPFL Laboratory of Biomedical Engineering

Selected Funded Research Projects (Past 5 Years)

- 2015–2018 – Adjustable Glaucoma Drainage Device (CTI-MedTech)
- 2015–2018 – Implantable Electrostimulator for Erectile Dysfunction (Wyss Foundation)
- 2016–2019 – Mechanisms of Aortic Aneurysm Progression (SNSF)
- 2018–2021 – Electrostimulation for Sexual Disorders (Innosuisse)
- 2020–2022 – Compliance-Matching Aortic Graft (Innosuisse)
- 2020–2024 – Hemodynamics of Physiological Ageing (SNSF)
- 2021–2023 – Noninvasive Cardiac Output Monitoring Device (Innosuisse)
- 2024–2028 – VITAL: Virtual Twins for Personalized Clinical Care (EU Horizon)

Teaching and Supervision

Courses:

- Biofluid Mechanics (3rd year BSc Life Sciences, 4 credits)
- Mechanics of the Cardiovascular System (1st year MSc, cross-disciplinary, 3 credits)
- Medical Technology (Graduate course, 3 credits)

Supervision:

- Supervised 30 PhD students (past and ongoing)

Professional Memberships and Editorial Roles

- Editorial Board: Journal of Biomechanics
- President: Cardiovascular System Dynamics Society
- Honor Societies: Sigma Xi, Tau Beta Pi, Phi Kappa Phi
- Professional Societies:
 - American Institute for Medical and Biological Engineering
 - Biomedical Engineering Society
 - American Physiological Society
 - American Society of Mechanical Engineers
 - Swiss Society of Biomedical Engineering (Board Member)
 - European Society for Engineering in Medicine
 - European Society of Biomechanics (Board Member)
 - Société de Biomécanique
 - Greek Society of Biomechanics

Awards

- 2023 – Oertli Prize for Ophthalmology (CHF 25,000)
- 1998 – Fondation de Vigier Prize (CHF 100,000)
- 1998 – Prix MAAF-SANTÉ, Société de Biomécanique (FF 25,000)
- 1998 – Venture 98 Prize

- 1990 – Research Excellence Award, Iowa State University
- 1990 – Teaching Excellence Award, Iowa State University

Publications

- Journal Papers: 350
- Book Chapters: 11
- Citations: >21,000 (Google Scholar)
- h-index: 73

Impact and major achievements

Hemodynamics

Recognized as a leading scientist in arterial hemodynamics, specifically in modeling arterial wave propagation and analyzing different aspects of arterial wave travel and reflection in health and disease. Developed and validated the most cited 1D model of the arterial network (1, 2).

Developed an advanced Windkessel model of the arterial tree and substantiated its physical meaning (3). Developed and validated the most accurate method for the estimation of total arterial compliance, the Pulse Pressure Method (4,5,6). Reviewed the fundamental aspects of wave propagation in the arterial system and discussed their implications in arterial hemodynamics and ventricular-vascular coupling (7). Developed inverse (8) or machine learning based (9,10) methods for deriving central hemodynamical properties of clinical interest from noninvasive peripheral measurements.

1. Stergiopoulos, N., Young, D. F., & Rogge, T. R. (1992). Computer simulation of arterial flow with applications to arterial and aortic stenoses. *Journal of biomechanics*, 25(12), 1477-1488.
2. Reymond, P., Merenda, F., Perren, F., Rufenacht, D., & Stergiopoulos, N. (2009). Validation of a one-dimensional model of the systemic arterial tree. *American Journal of Physiology-Heart and Circulatory Physiology*, 297(1), H208-H222.
3. Stergiopoulos, N., Westerhof, B. E., & Westerhof, N. (1998). Physical basis of pressure transfer from periphery to aorta: a model-based study. *American Journal of Physiology-Heart and Circulatory Physiology*, 274(4), H1386-H1392.
4. Stergiopoulos, N., Meister, J. J., & Westerhof, N. (1994). Simple and accurate way for estimating total and segmental arterial compliance: the pulse pressure method. *Annals of biomedical engineering*, 22, 392-397.
5. Stergiopoulos, N., Segers, P., & Westerhof, N. (1999). Use of pulse pressure method for estimating total arterial compliance in vivo. *American Journal of Physiology-Heart and Circulatory Physiology*, 276(2), H424-H428.
6. Stergiopoulos, N. M. J. W. N., Meister, J. J., & Westerhof, N. (1995). Evaluation of methods for estimation of total arterial compliance. *American Journal of Physiology-Heart and Circulatory Physiology*, 268(4), H1540-H1548.
7. Stergiopoulos, N., Westerhof, B. E., & Westerhof, N. (1999). Total arterial inertance as the fourth element of the windkessel model. *American Journal of Physiology-Heart and Circulatory Physiology*, 276(1), H81-H88.
8. Bikia, V., McEniery, C. M., Roussel, E. M., Rovas, G., Pagoulitou, S., Wilkinson, I. B., & Stergiopoulos, N. (2022). Validation of a Non-invasive Inverse Problem-Solving Method for Stroke Volume. *Frontiers in Physiology*, 12.
9. Bikia, V., Papaioannou, T. G., Pagoulitou, S., Rovas, G., Oikonomou, E., Siasos, G., Tousoulis, D., & Stergiopoulos, N. (2020). Noninvasive estimation of aortic hemodynamics and cardiac contractility using machine learning. *Scientific Reports*, 10(1).

10. Bikia, V., Lazaroska, M., Scherrer Ma, D., Zhao, M., Rovas, G., Pagoulatou, S., & Stergiopulos, N. (2021). Estimation of Left Ventricular End-Systolic Elastance From Brachial Pressure Waveform via Deep Learning. *Frontiers in Bioengineering and Biotechnology*, 9.

Technology transfer and entrepreneurship

Translational research in medical devices. Our laboratory is recognized as a leader in translational research in medical devices, being one of the most prolific European academic lab in terms of medical devices brought from the research bench to actual clinical practice. Our group conceived, designed and developed more than 10 different types of medical implants. All of those inventions resulted in patents and provided the basis for the development of medical devices, some already being successful clinical products, the rest currently under preclinical or clinical development. The main innovations are:

- **FloWatch (EndoArt S.A.)** FloWatch® is a unique technology for wirelessly operated and powered blood flow controllers or artificial sphincters. The first application of the FloWatch technology was congenital heart disease. The FloWatch®-PAB has been implanted in more than 500 babies in Europe, with excellent clinical results. The FloWatch technology was also used to develop a Telemetric Gastric Banding (FloWatch®-TGB) device to treat morbid obesity. Acquired by Allergan Inc. in 2007 for CHF 120 million.
 - **EyeWatch® (Rheon Medical S.A.)**. The eyeWatch® is an adjustable glaucoma drainage device (GDD), for the surgical treatment of glaucoma. The eyeWatch is developed by Rheon Medical SA, a company founded in 2010. The eyeWatch is currently in clinical trials, with more than 1000 patients having received the eyeWatch implant and outstanding clinical results.
 - **CaverSTIM® (Comphy S.A.)** caverSTIM® is a telemetrically-controlled, implantable electrostimulation device for restoring erectile function in radical prostatectomy and spinal cord injury patients. caverSTIM® is being developed by Comphy SA, a MedTech start-up founded in 2017. Results from a pilot clinical study in Melbourne, Australia, have shown outstanding recovery of erectile function post-prostatectomy. Very promising results were also obtained for spinal cord injury patients in a pilot study in Brazil.
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Press and social media impact

Television

- Popular TV show “Ωραίοι ως Έλληνες”, featuring distinguished scientists from the Greek diaspora. <https://www.youtube.com/watch?v=ZpfdmNj-SrU>
- “Trust me I am a doctor”, most popular BBC show on health-related topics, special show on the eyeWatch implant

Press

- *24 Heures*, May 8, 1998, « *Les chercheurs vaudois mettent dans le mille* »
- *Le Temps*, May 16, 1998, « *L’esprit d’entreprise existe en Suisse, Venture 98 le prouve* »
- *24 heures*, June 26, 1998, « *Un implant médical vaut le Prix Vigier à deux Vaudois* »
- *Le Temps*, June 26 1998, « *Grâce à un nouvel implant, EndoArt espère combattre l’artériosclérose* »
- *Bilanz*, June 1998, « *Blut fliest, geld auch* »
- *L’Agefi*, October 30, 1998, « *EndoArt cherche 20 millions de francs pour limiter les risques d’infarctus* »
- *L’Agefi*, March 24, 1999, « *La société EndoArt séduit sept investisseurs* »
- *L’Agefi*, July 7, 2000, « *La start-up lausanoise EndoArt lève 14 millions de francs suisses* »
- *Le Temps*, October 10, 2000, « *EndoArt, ou l’art de réparer durablement les coronaires* »
- *Le Temps*, March 28, 2006, « *Des pompes implantables toujours plus petites* »
- *L’Agefi*, February 23, 2007, “*Le californien Allergan avale la start-up vaudoise EndoArt*”
- *Wall Street Journal*, February 23, 2007, “*Allergan purchases EndoArt*”
- *Le Temps*, February 27, 2007, “*Près de 120 millions pour une start-up de l’EPFL* »
- *EXCEL Leaders*, November 2007, « *Nikos Stergiopulos, Revelation d’un battant*”
- *PME Magazine*, December 2007, “*La deuxième réplique d’un modèle gagnant* »
- *Le Temps*, November 5, 2012, « *Rheon Medical teste un implant contrôlable à distance pour traiter le glaucome*”

- *Le Temps*, May 13, 2013, « Rheon Medical lève son premier million »
- *TO BHMA*, 18 Νοεμβρίου 2016, « Μαγνητική λύση σώζει το μάτι»
- *PME*, March 27, 2018, « Comphya veut révolutionner le traitement des troubles érectiles»
- *Bilan*, April 18, 2018, « Spin-off de l'EPFL, Comphya crée un viagra électronique »
- *Sciences et Avenir*, May 17, 2028, « Dysfonction érectile : des implants télécommandés pour une érection à la demande »
- *Le Matin*, May 23, 2018, « Un implant pour des érections télécommandées »
- *E-Santé*, May 11, 2018, « Dysfonction érectile : une prothèse capable de déclencher l'érection du pénis»
- *Swiss Science Today*, August 18, 2021, « Rheon Medical révolutionne le traitement chirurgical du glaucome»
- *Bilan*, October 21, 2021, « L'implant de Rheon Medical séduit l'Amérique »
- *Venture Lab*, February 2, 2025, « Comphya secures CHF 4.35M in Series A first tranche to support CaverSTIM clinical trials»