David P. Stonko, MD, MS

Vascular Surgeon | Clinical AI and Machine Learning | Applied Mathematician

Baltimore, MD | dstonko1@jhmi.edu | localminimum.us | github.com/davidstonko

SUMMARY

Vascular surgeon and applied mathematician. I work across the AI stack, from the underlying mathematics to deployment, and have built clinical machine learning models since 2011. At Meta I work on frontier medical knowledge AI reasoning, currently focused on long time horizon reinforcement learning tasks in medicine and surgery. At Johns Hopkins I advise the Department of Surgery on AI strategy, belong to the Data Science and AI Institute, and sit on the workgroup deploying OpenEvidence at Johns Hopkins. At Catalio Capital I run diligence on AI companies in health care. I have written 81 original research articles, and six clinical practice guidelines cite my work. Board certified in general surgery, now in vascular surgery fellowship at Johns Hopkins.

CORE STRENGTHS

Vascular surgery: open and complex endovascular aortic, trauma, oncovascular reconstruction, PAD, carotid, dialysis access

General surgery: board certified, with emergency general surgery, trauma and robotic surgery (da Vinci credentialed)

AI, the full stack: Mathematics of learning (linear algebra, optimization, model architectures) • Geometric foundations on SE(3) and world modeling of vascular and endovascular surgery • Transformers, embeddings and anatomy-informed neural networks • Pre-training, fine-tuning and reinforcement learning • Scaling laws and benchmarks • Rubric building, frontier model testing and failure analysis • Agentic AI, frontier and local models, compute • Clinical prediction models • AI strategy and patient safety

CLINICAL AI EXPERIENCE

Meta | Medical Knowledge Expert 2026 - present

Physicians Who Code contractor pool (passed the Meta coding exam), through Tundra Technical Solutions, remote

- Development of frontier medical knowledge AI reasoning, currently focused on long time horizon reinforcement learning tasks in medicine and surgery.
- Build rubrics, test frontier models and research model failures at the frontier of clinical AI, drawing on my vascular and general surgery practice.

Johns Hopkins | AI Strategy, Deployment and Education 2025 - present

- Advise the Department of Surgery on AI strategy. Member, Johns Hopkins Data Science and AI Institute.
- Member, Johns Hopkins Medicine Simulated Experiment Workgroup, led by the Vice Dean for Education, for the deployment of OpenEvidence at Johns Hopkins.
- Founded the AI and Surgery Interest Group in the Department of Surgery and write its weekly newsletter, The Local Minimum (localminimum.us).
- Built open-source AI (Claude) tools now used by residents, fellows, faculty, staff and leadership in the department and by members of the Data Science and AI Institute. The tools work from placeholders, so no patient information reaches the model. User feedback goes into each release.
- Gave Department of Surgery Grand Rounds, "AI for Surgeons: What is it, how does it work, and how do I use it?" (2026, video: youtu.be/TD1xYmY5_iU).
- Gave a Faculty Development Series talk, "The New Statistical Literacy: Why Surgeons Should Learn How AI Actually Works" (2026).

Viz.ai | Consultant and Investigator 2022 - 2024

- Consulted on machine learning strategy, product development and clinical trials for aortic and carotid algorithms.

Clinical Machine Learning Research | Vanderbilt, Johns Hopkins, Mayo Clinic 2016 - present

- Built neural networks for surgical prediction. One predicted six-month outcome after pediatric traumatic brain injury better than CT grading systems (AUC 0.95 versus 0.78 to 0.84). Others forecast trauma volume and acuity and held their accuracy in external validation at five Level I trauma centers.
- Led the development, validation and rollout of an automated trauma activation tool at Vanderbilt University Medical Center. The Life Flight team used it to assign activation levels for incoming patients, and it cut under- and over-triage errors.
- Building the mathematical foundations for world models of vascular and endovascular surgery: anatomy-informed neural networks, which build anatomic knowledge into deep learning, and an SE(3) formulation of how a stiff guidewire deforms the aortoiliac tree (arXiv preprint, 2026).
- Co-PI and dataset lead for EVAR-Pair, an open, AI-ready library of complete vascular surgery patient episodes (Data Science and AI Institute Trusted Dataset Award, submitted 2026, pending).
- Wrote a scoping review of FDA-approved or cleared AI tools relevant to vascular surgeons. Released an open-source aortic segmenter and EVAR planner that works from CT angiography.

STRATEGY, INDUSTRY AND PARTNERSHIPS

Catalio Capital Management (cataliocapital.com/team/david-stonko**) | Clinical Associate (Analyst, 2022)** 2022 - present

- Lead investment diligence on clinically focused companies, now mostly AI-related, along with surgical and vascular ones. This has included AI companies such as Flourish and AI-enabled device companies such as Imperative Care.

Scientific Advisory Board | Stealth endovascular device company 2026 - present

Founder | Patapsco Biomedical, LLC 2021 - present

- Manage intellectual property and business development for a new intravenous fluid delivery device (WO 2023/076322).

Device and Regulatory Consulting 2021 - 2024

- Sisu Global Health: designed the IDE-enabling large-animal trial and took part in FDA interactions. Vivonics: ran the large-animal trial whose data supported the company's FDA application. Also consulted for Artio Medical and Sonovex.
- Reviewer, NSF SBIR Phase II panel, Medical Diagnostics, Devices and Healthcare Workflow (2023).

CLINICAL EXPERIENCE

The Johns Hopkins Hospital | Clinical Fellow, Vascular Surgery and Endovascular Therapy 2025 - present

- Open and endovascular vascular surgery, vascular lab interpretation, consults and call. Took part in the program's first endovascular aortic arch repair with the Artivion Nexus device, the hospital's first Philips VesselNavigator image-fusion case, and the first Philips LumiGuide case in Maryland.

The Johns Hopkins Hospital | Resident and Chief Resident, General Surgery 2018 - 2025

- Led a quality improvement project that raised long-term follow-up after carotid revascularization from 64.9% to 78.8% (269 patients) by automating appointment creation and reminders. As chief resident, led a multicenter resident QI project on patient education after dialysis access surgery.

Henry M. Jackson Foundation | Postdoctoral Research Fellow 2021 - 2023

- Battlefield Shock and Organ Support Research Program: Department of Defense funded large-animal research at University of Maryland Shock Trauma and the Mayo Clinic. Helped found the Mayo Clinic Vascular and Endovascular Innovation Laboratory and move the research program there.

CLINICAL CONTENT, EVIDENCE AND PUBLISHING

- 81 original research articles, 7 reviews, 7 book chapters and 40 national or international podium presentations.
- Six clinical practice guidelines cite my work, among them the European Society for Vascular Surgery 2025 vascular trauma guidelines (five studies) and the Society for Vascular Surgery 2025 claudication update (two studies).
- Write board-style assessment items for the vascular surgery curriculum (SCORE Portal, TWIS Vascular).
- Peer reviewer for 13 journals, including Journal of Vascular Surgery, Journal of the American Heart Association, Surgery and Scientific Reports. Member, Communications Committee, Vascular and Endovascular Surgery Society.

SELECTED AI PUBLICATIONS (OPENALEX CITATION COUNTS, NOVEMBER 2026)

1. Hale AT, **Stonko DP**, Brown A, et al. Machine-learning analysis outperforms conventional statistical models and CT classification systems in predicting 6-month outcomes in pediatric patients sustaining traumatic brain injury. Neurosurg Focus. 2018;45(5):E2. *Cited 122 times.*
2. Hale AT, **Stonko DP**, Wang L, Strother MK, Chambless LB. Machine learning analyses can differentiate meningioma grade by features on magnetic resonance imaging. Neurosurg Focus. 2018;45(5):E4. *Cited 70 times.*
3. Hale AT, **Stonko DP**, Lim J, et al. Using an artificial neural network to predict traumatic brain injury. J Neurosurg Pediatr. 2019;23(2):219-226. *Cited 54 times.*
4. **Stonko DP**, Guillamondegui OD, Fischer PE, Dennis BM. Artificial intelligence in trauma systems. Surgery. 2021;169(6):1295-1299. *Cited 42 times.*
5. Wise ES, **Stonko DP**, Glaser ZA, et al. Prediction of prolonged ventilation after coronary artery bypass grafting: data from an artificial neural network. Heart Surg Forum. 2017;20(1):E007-E014. *Cited 40 times.*
6. **Stonko DP**, Dennis BM, Betzold RD, et al. Artificial intelligence can predict daily trauma volume and average acuity. J Trauma Acute Care Surg. 2018;85(2):393-397. *Cited 32 times.*
7. **Stonko DP**. Anatomy-informed neural networks: encoding anatomic priors in loss and architecture, with an SE(3) formulation of guidewire-induced aortoiliac deformation. arXiv:2608.21332 [cs.AI]. 2026. *Foundational preprint.*

EDUCATION, CERTIFICATION AND HONORS

Board certified, American Board of Surgery (General Surgery). Maryland medical license, active. 2025

MD, Vanderbilt University School of Medicine 2018

MS, Applied Mathematics, University of Maryland, Baltimore County 2014

BS, Mathematics, and BS, Biological Sciences, University of Maryland, Baltimore County 2013

Honors: Alpha Omega Alpha, 2025. Excellence in Overall Performance in Surgery Award, 2025. H. William Scott Prize in Surgery, Vanderbilt, 2018. First place, ACS Medical Student Research Competition, 2017.

Technical: Python, MATLAB, Stata, LaTeX, HTML and CSS (working knowledge of SAS, R, C, JavaScript). Daily agentic AI use with Claude, ChatGPT, Gemini and local open-weight models.