

Paweł Rynio

MD, PhD, DSc (dr hab. n. med. i n. o zdr.)

Vascular surgeon · Innovator · Scientist — 3D printing, mixed reality and AI in aortic surgery

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PROFILE

Aortic operator and clinician-innovator combining daily endovascular practice (EVAR, TEVAR, F/B-EVAR, PMEG) with translational R&D and real technology transfer. Creator of the Szczecin Method: physician-modified endografts built on patient-specific 3D-printed aortic templates. Operator of the world's first holographically-guided EVAR. Core strength: innovation — a portfolio of patents, utility models and patent applications, six world/Poland-first implementations, six translational R&D projects, two investigator-initiated randomized trials and the HoloGraft spin-off; over PLN 30 million in R&D funding secured. Author of 121 scientific publications (cumulative IF 124.7).

CURRENT POSITIONS

Associate Professor (adiunkt)

Department of Vascular Surgery, General Surgery and Angiology, Pomeranian Medical University in Szczecin (PUM)

Head

Center for Medical 3D Technologies (OMT3D), University Clinical Hospital No. 2 PUM — Poland's first hospital-based medical 3D printing center

Deputy Head

Aortic Team, University Clinical Hospital No. 2 PUM — Poland's first multidisciplinary aortic team (ESVS/EACTS standards)

Founder

HoloGraft sp. z o.o. — PUM spin-off: mixed-reality holographic navigation for endovascular surgery

Certified proctor

International endovascular training programs, Central-Eastern Europe — EVAR / TEVAR / PMEG

Associate Editor

BMC Surgery; reviewer for 10+ journals (EJVES, JEVT, QIMS, JCM and others)

PIONEERING ACHIEVEMENTS

2018 — World's first 3D-printed aortic arch template for PMEG

J Endovasc Ther 2018;25(5):554–558 — opened the validated 3D-printing-supported PMEG workflow

2019 — World's first holographically-guided EVAR

CT-derived aortic hologram in the operator's field of view (Microsoft HoloLens); J Endovasc Ther 2019;26(4):544–547

2021 — World's first patented mixed-reality stent-graft modification method

Patent PL 242758 (valid until 2041) + international PCT procedure (WIPO); part of a broader IP portfolio

2021 — Poland's first hospital-based medical 3D printing center (OMT3D)

100+ aortic templates — among the world's largest series — plus numerous clinical models; Stratasys J750 Digital Anatomy; CEE reference center

2025 — Radiation-protective exoskeletons: first in Poland, second in Europe

Plus design and conduct of PROTECT-EVAR — the world's first RCT of exoskeletons in endovascular aortic surgery

2026 — World's first 3D-printed needle guide for type II endoleak embolisation

Eur J Vasc Endovasc Surg 2026 (IF 6.8)

CENTER-SCALE CLINICAL TOOLKIT — TECHNIQUES FIRST INTRODUCED AT USK-2

All the pioneering solutions above are clinically implemented at USK No. 2 PUM. Alongside them, first introduced and developed by me at the center: mechanical thrombectomy of the visceral arteries in acute mesenteric ischemia (Penumbra) — the largest case volume in Poland, with a dedicated registry and invited lectures; mechanical thrombectomy (Rotarex); laser atherectomy; in situ stent-graft fenestration (diathermy-connected guidewire and laser); and transcaval and transgraft embolization of type II endoleaks — complementing the world-first 3D-printed translumbar needle guide.

PATENTS & INTELLECTUAL PROPERTY

Patent PL 242758 (valid until 2041) — computer-assisted manufacturing and fitting of endovascular prostheses using a virtual aortic template — a 3D hologram overlaid on the stent-graft in mixed reality — extended internationally via a PCT procedure (WIPO) for the HoloGraft platform; utility model protection right Ru.074252; and patent applications (incl. P.448089 and P.444301) in the field of endovascular devices, medical 3D printing and rehabilitation technology.

RESEARCH FUNDING (PRINCIPAL INVESTIGATOR / PROJECT MANAGER)

PLN 14.2M — Medical Research Agency (ABM), since 2021 — Principal Investigator

Multicenter RCT: PMEG on 3D-printed template vs custom-made stent-graft; 100 patients, 3 centers; ClinicalTrials.gov NCT06969729

EUR 2.78M — Interreg VI A "SKILLAB", 2024–2027 — Project Manager

Polish-German Laboratories of Surgical Excellence (PUM ↔ Universitätsmedizin Greifswald); radiation-exoskeleton rollout

EUR 1.34M — Interreg V A Pomerania, 2020–2022 — Project Manager

Creation of the Center for Medical 3D Technologies (OMT3D)

6 × Ministry "Innovation Incubator" projects — Lead

HoloGraft, iRadiolog, EndoPlanner, ThoraxPlanner, VolumiGence, AngioVRRehab

PROTECT-EVAR (NCT07528144) — Originator & clinical lead, recruiting

World's first randomized crossover trial: radiation exoskeletons vs lead aprons; real-time dosimetry + operator musculoskeletal strain

EDUCATION & ADVANCED TRAINING

Habilitation (DSc), 2023 — Pomeranian Medical University in Szczecin

Monothematic cycle: "Innovative applications of 3D printing technology in vascular surgery"

Harvard Medical School — GCSRT, 2023–2024

Global Clinical Scholars Research Training: clinical research methodology and biostatistics; HMS Associate Member

Harvard Medical School — Lab of Medical Imaging, 2020

Research collaboration on "One-Click DICOM to 3D Printed Model" automation, culminating in an RSNA 2020 presentation (Chicago)

University of Chicago — SVS International Mentorship, 2021

Mentorship under the center's Chief of Vascular Surgery, culminating in a joint publication

Hôpital Marie-Lannelongue, Paris, 2018

Advanced course at a leading European FEVAR/BEVAR center

Fuwai Hospital, Beijing · Hangzhou, 2018–2019

Exchange with the local aortic team — type B dissection and stent-graft techniques

MD (2013) & PhD (2017)

Pomeranian Medical University in Szczecin; board-certified vascular surgeon (2021)

SELECTED PUBLICATIONS (OF 121)

Rynio P, Skórka P, Gutowski P, Kazimierczak A. Enhancing technical precision in translumbar embolisation of type II endoleaks using a custom 3D printed needle guide. *Eur J Vasc Endovasc Surg* 2026. doi: [10.1016/j.ejvs.2026.01.001](https://doi.org/10.1016/j.ejvs.2026.01.001)

Rynio P, et al. Influence of hemostatic disorder on type II endoleak development after endovascular abdominal aortic aneurysm repair. *Int J Mol Sci* 2026. doi: [10.3390/ijms27073288](https://doi.org/10.3390/ijms27073288)

Rynio P, Gutowski P, Kazimierczak A. Physician-modified stent-grafts created in the 3D aortic template have better reliability and greater alignment with the target vessels. *J Endovasc Ther* 2023. doi: [10.1177/15266028221095396](https://doi.org/10.1177/15266028221095396)

Rynio P, et al. Effects of sterilization methods on different 3D printable materials for templates of physician-modified aortic stent grafts. *Int J Mol Sci* 2022. doi: [10.3390/ijms23073539](https://doi.org/10.3390/ijms23073539)

Rynio P, et al. The accuracy and reliability of 3D printed aortic templates: a comprehensive three-dimensional analysis. *Quant Imaging Med Surg* 2022. doi: [10.21037/qims-21-529](https://doi.org/10.21037/qims-21-529)

Rynio P, Jedrzejczak T, Rybicka A, Milner R, Gutowski P, Kazimierczak A. Initial experience with fenestrated physician-modified stent grafts using 3D aortic templates. *J Clin Med* 2022. doi: [10.3390/jcm11082180](https://doi.org/10.3390/jcm11082180)

Rynio P, Witowski J, Kamiński J, Serafin J, Kazimierczak A, Gutowski P. Holographically-guided endovascular aneurysm repair. *J Endovasc Ther* 2019. doi: [10.1177/1526602819854468](https://doi.org/10.1177/1526602819854468)

Kazimierczak A, Rynio P, et al. Expanded PETTICOAT technique to promote the reduction of contrasted false lumen volume in chronic type B aortic dissection. *J Vasc Surg* 2019. doi: [10.1016/j.jvs.2019.01.073](https://doi.org/10.1016/j.jvs.2019.01.073)

Rynio P, Kazimierczak A, Jedrzejczak T, Gutowski P. A 3-dimensional printed aortic arch template to facilitate the creation of physician-modified stent-grafts. *J Endovasc Ther* 2018. doi: [10.1177/1526602818792266](https://doi.org/10.1177/1526602818792266)

Full bibliography: pubmed.ncbi.nlm.nih.gov (Rynio P[Author]) · ORCID 0000-0003-3365-1822

AWARDS & HONORS

IPITEx 2020, Bangkok

Gold medal + special award (HoloGraft); silver medal (iRadiolog) — among 500+ inventions worldwide

IEI 2025, Guangzhou

Gold Medal, Jury Prize and ARCA Award (iRadiolog)

InnoWings 2024 & 2025

Gold medals (EndoPlanner, VolumiGence) — first team with gold in two consecutive editions

Budi Uzor Inova 2022, Croatia · Inex 2022, India

Gold medals for the team's invention portfolio (incl. ThoraxPlanner)

Geneva Inventions 2025

Silver medal (iRadiolog — AI diagnostics of acute aortic syndromes)

"West Pomeranian Nobel" 2022

Regional award for the most outstanding scientists — 3D printing in aortic aneurysm treatment

Rynek Zdrowia Award 2021

"Innovative solution in medicine" (HoloGraft)

PTChN 2019 · PUM Rector's Awards

Best presentation, 11th PTChN Conference; repeated Rector's research and teaching awards

EXPERT ROLES & MEMBERSHIPS

ESVS PMEG Position Statement Advisory Group

Core advisory group member — co-authoring the official European Society for Vascular Surgery position on PMEG

Faculty of international aortic courses

TEVAR MAX (Istanbul, Amsterdam, Barcelona), Aortic STEP UP (Malta), TBAD (Belgrade), APlus (Istanbul); proctoring endovascular centers across CEE

Mentor

Medical 3D Technologies student society (since 2017): 20+ conference papers, IF publications, SVS Travel Scholarship laureate