Christos Zacharopoulos, Ph.D.

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Clinical AI Research Leader | Medical Device AI | Biosignals | Regulatory Validation

Professional Summary

PhD-trained clinical AI research leader with 8+ years developing and validating machine learning systems for regulated medical environments. Multimodal biosignal experience across EEG, ECG, GSR (galvanic skin response), and impedance signals across psychiatric disorders, peripheral arterial disease (PAD), lung cancer, and cardiac imaging. Experienced in clinical study design, statistical analysis plans, external validation, and regulatory evidence generation for FDA PCCP (Predetermined Change Control Plan) and CE MDR (European Medical Device Regulation) pathways. First-author publications at EMNLP, IJCNLP, and Cortex.

Selected Impact

- Built the end-to-end biosignal and imaging feature extraction pipeline (EEG, ECG, GSR; feature engineering, model development, and inference) underlying a biomarker algorithm that ranked first on the TDBrain Challenge Leaderboard (normalised positive predictive value, nPPV: 127%/123% for ADHD and MDD treatment prediction; both independently replicated), externally validated across 10,000+ subjects (TRIPOD Type 4 external validation standard).
- First-authored four PAD clinical abstracts at PVI 2024 (Paris) and JET OPEN the world 2025 (Osaka): in-vivo SEPARATE (17 patients; physician-model agreement on red blood cell (RBC)-rich tissue identification) and ex-vivo E-SEPARATE (15 patients; R^2=0.79 vs histology gold standard).
- First-author publication at EMNLP 2023 (top 14% of submissions), co-authored with researchers from Meta AI Research and Collège de France.
- Delivered three full-cycle clinical ML projects at Sensome, from protocol design and Statistical Analysis Plan through clinical stakeholder reporting, with all milestones completed on time.

Professional Experience

Head of Research · DESKi · Bordeaux, France — Feb 2026 – Present

Startup developing medical imaging AI for cardiac care; products developed under FDA and CE MDR regulatory pathways. Leads one Data Lead and two researchers; reports to the CPO; works across clinical affairs, medical, and regulatory quality functions.

- Steer research strategy, execution, and delivery across cardiac ultrasound classification, segmentation, and detection projects.
- Ensure research milestones stay aligned with FDA PCCP and CE MDR regulatory submission timelines, building AI validation documentation and evidence packages that translate findings into technical regulatory inputs.
- Authored the Statistical Analysis Report and produced analysis deliverables for HF-VCOM (AI-guided echocardiography training for medical students); contributed to an abstract submitted to OMED 2026 (joined after data collection and image-processing analysis).
- Restructured the cross-functional AI/ML-clinical-regulatory review meeting, strengthening alignment and decision-making across research, clinical and regulatory functions.

Sensome · *Paris, France* — May 2023 – Jan 2026

Medical device company developing impedance-based tissue classification across PAD and lung cancer; Clotild® Smart Guidewire System holds FDA Breakthrough Device designation.

Machine Learning Lead — Nov 2024 – Jan 2026

Led a team of 3 data scientists; reported to CEO and CIO; worked cross-functionally with a clinical team of 3.

- Directed three concurrent clinical ML studies: SEPARATE (in-vivo PAD clinical study, 17 patients), E-SEPARATE (ex-vivo PAD study, 15 patients), and INSPECT (first-in-human lung cancer study, 26 patients); owned protocol design, Statistical Analysis Plan, and data analysis end to end, with all milestones completed on time.
- Led first-author clinical abstract submissions for SEPARATE and E-SEPARATE at PVI 2024 and JET OPEN 2025; served as ML analysis lead (third author) on INSPECT at ATS 2026, Orlando (analysis conducted at Sensome; presented post-departure; 80.9% accuracy healthy vs lesion; 78.7% accuracy cancer vs all tissue; learning curves r^2=0.92/0.84), extending the portfolio from peripheral arterial disease into lung cancer.

- Automated the full ML workflow from data ingestion through feature engineering, model training, and inference; developed uncertainty quantification methods at both labelling and inference time, providing calibrated model confidence for high-risk clinical decision support.
- Reported ML tissue classification results to the Scientific Advisory Board, contract research organisations (CROs), and external clinicians across all three project phases, communicating technical findings in clinical language for non-specialist audiences.

Senior Data Scientist May 2023 – Nov 2024

- Built the foundational data infrastructure for two concurrent PAD clinical trials (ingestion and inference systems); designed a project-agnostic impedance feature set with redundancy elimination, developed and validated tissue classification models (E-SEPARATE: R^2=0.79 vs histology gold standard), and built labelling protocols spanning impedance measurements and digital pathology, producing signal representations and models reusable across clinical projects.
- Served as the primary analytical contact for the CLOTILD in-vivo PAD trial, designing results visualisation and coordinating dissemination across clinical teams, CROs, and external stakeholders.

Sama Therapeutics · *Boston, USA (remote)* Jul 2022 – May 2023

Digital therapeutics startup developing ML biomarkers from EEG, ECG, and GSR biosignals across major psychiatric disorders. Reported directly to CEO and CSO.

Principal Machine Learning Engineer Jan – May 2023

Led a team of 5 data scientists and engineers; promoted from Senior within 6 months.

- Owned biosignal and imaging feature extraction (EEG, ECG, GSR) end-to-end (data ingestion, preprocessing, feature extraction, and model training) across 10,000+ aggregated subjects; model performance: nPPV 127%/123% (ADHD/MDD treatment prediction; ranked first on TDBrain Challenge Leaderboard, independently replicated); AUC 60–80% across diagnoses; externally validated to TRIPOD Type 4; results presented at the 6th Neuropsychiatric Drug Development Summit, Boston.
- Managed project delivery and code review, communicating results to the Scientific Advisory Board, external clients, and clinical partners.

Senior Machine Learning Engineer Jul 2022 – Dec 2022

- Built the biosignal data infrastructure (ingestion, preprocessing, feature stores, and inference pipelines) underpinning the transprognostic biomarker system, processing EEG, ECG, and GSR data from 10,000+ subjects and enabling the TRIPOD Type 4 validation study.

Data Scientist / Researcher (Ph.D.) · CEA / NeuroSpin, Unicog Lab · *Paris, France* 2018 – 2022

French national research institute; PhD research on neural and computational models of language under Prof. Stanislas Dehaene.

- Designed two neuroimaging experiments (EEG and magnetoencephalography, MEG) and one online behavioural study; collaborated with US partners on intracranial (iEEG and ECoG) data analysis across 2 TB of multimodal data, coordinating collection across sites in France and the US.
- Compared combined MEG/EEG during sentence reading with a two-layer LSTM on identical sentences: hierarchical structure was decodable from brain signals; transition and congruity effects stayed at chance, unlike the model (Cortex, Elsevier, 2026). Related first-author EMNLP 2023 paper on grammatical agreement in humans and language models.

Data Scientist · INSERM · *Paris, France* 2017 – 2018

French national medical research institute; intracranial neuroimaging data across multiple hospital sites.

- Co-developed an intracranial EEG pipeline for automatic detection of pathological sensors across multiple hospital sites, reducing manual data-cleaning time; analysed hippocampal events from 112 GB of intracranial data supporting international collaborative research on memory and cognition.

Education

Ph.D. — Cognitive Neuroscience | Applied Machine Learning · Sorbonne University / NeuroSpin · *Paris, France* 2018 – 2022

Supervisor: Prof. Stanislas Dehaene · Thesis: On the dissociation of structural and linear operations in sentence processing

M.Sc. (M2) — Cognitive Neuroscience · Donders Institute, Radboud University · *Nijmegen, Netherlands* 2015 – 2017

Thesis: Reconstructing the perceptual organisation of sound from neural responses

B.Sc. — Physics (EEG Analysis and Applications) · Aristotle University of Thessaloniki · *Greece*
2010 – 2015

Languages: Greek (native) · English (full professional) · French (professional working)

Selected Publications

Zacharopoulos, C.-N., Desbordes, T., & Sablé-Meyer, M. (2023). Assessing the influence of attractor-verb distance on grammatical agreement in humans and language models. *Proceedings of EMNLP 2023.* First author; co-authored with Meta AI Research and Collège de France, PSL. Top 14% of submissions.

Zacharopoulos, C.-N., & Kyriakoglou, R. (2025). Decoding Emergent Big Five Traits in Large Language Models: Temperature-Dependent Expression and Architectural Clustering. *Proceedings of IJCNLP 2025.* First author.

Zacharopoulos, C.-N., & Kyriakoglou, R. (2025). In Machina N400: Pinpointing Where a Causal Language Model Detects Semantic Violations. Artificial Intelligence and Cognitive Science (AICS 2025), CCIS Vol. 2950, Springer. First author.

Ahmed, S., Moore, T., Zacharopoulos, C.-N., et al. A transprognostic multimodal algorithm predicts MDD, ADHD, OCD, and PTSD treatment response in clinical trials. 6th Neuropsychiatric Drug Development Summit, Boston. Third author (biosignal and imaging feature extraction lead); externally validated across 10,000+ subjects; ranked first in blinded international competition.

Zacharopoulos, C.-N., et al. (2025). In-vivo impedance identification of RBC-rich clot in peripheral arterial disease using the Clotild® Smart Guidewire System. Japan Endovascular Treatment Conference (JET OPEN the world 2025), Osaka. First author; ML analysis lead.

Zacharopoulos, C.-N., et al. (2025). Ex-vivo machine learning impedance analysis for thrombus analysis in peripheral arterial disease. Japan Endovascular Treatment Conference (JET OPEN the world 2025), Osaka. First author; ML analysis lead.

Hanna, A., et al. (2026). In situ lung tissue characterization using bioimpedance for tool-in-lesion confirmation during bronchoscopic biopsy: results from the first-in-human study INSPECT. *ATS 2026 International Conference, Orlando (presented May 2026).* Third author (ML analysis lead); 26 patients; 80.9%/78.7% accuracy.

Zacharopoulos, C.-N., Dehaene, S., & Lakretz, Y. (2026). Disentangling hierarchical and sequential computations during sentence processing. Cortex (Elsevier).