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Hacking stroke in women: towards aetiology-driven precision prevention

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List of publications

1. **Van Os HJA**, Mulder IA, Broersen A, Algra A, van der Schaaf IC, Kappelle LJ, Velthuis BK, Terwindt GM, Schonewille WJ, Visser MC, Ferrari MD, Van Walderveen MAA, Wermer MJH. Migraine and cerebrovascular atherosclerosis in patients with ischemic stroke. *Stroke*. 2017;48:1973-1975.
2. Voigt S, **van Os HJA**, van Walderveen M, van der Schaaf IC, Kappelle LJ, Broersen A, Velthuis BK, De Jong PA, Kockelkoren R, Kruijff ND, Algra A, Wermer MJH. Sex differences in intracranial and extracranial atherosclerosis in patients with acute ischemic stroke. *Int J Stroke*. 2021;16:385-391.
3. **Van Os HJA**, Wermer MJH, Rosendaal FR, Govers-Riemslog JW, Algra A, Siegerink B. Intrinsic Coagulation Pathway, History of Headache, and Risk of Ischemic Stroke. *Stroke*. 2019;50:2181-2186.
4. **Van Os HJA**, Ruigrok YM, Verbaan D, Dennesen P, Muller MCA, Coert BA, Algra A, Vergouwen MDI, Wermer, MJH. Delayed cerebral ischemia after aneurysmal subarachnoid hemorrhage in patients with a history of migraine. *Stroke*. 2020;51:3039-3044.
5. **Van Os HJA**, Verbaan D, Ruigrok YM, Dennesen P, Muller MCA, Coert BA, Vergouwen MDI, Wermer, MJH. Delayed cerebral ischemia after aneurysmal subarachnoid hemorrhage in young patients with a history of migraine. *Stroke*. 2022;101161.
6. **Van Os HJA**, Linstra KL, Ferrari MD, Dekkers OM, Helmerhorst FM, Terwindt GM, Maassen-Van den Brink A, Kittner SJ, Wermer MJH. Risk of ischemic stroke in women with migraine and hormonal contraceptives: case-control study and meta-analysis of the literature. *Submitted*
7. **Van Os HJA**, Ruigrok YM, Mannien J, Van Dijk EJ, Koudstaal PJ, Luijck GJ, Nederkoorn PJ, Van Oostenbrugge RJ, Visser MC, Kappelle LJ, Algra A, Wermer MJH. Dutch Parelsnoer Institute-Cerebrovascular accident (CVA) Study: a large standardized multicenter clinical biobank. *Open Journal of Bioresources*. 2018; 5, p.8.

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8. Linstra KM, **van Os HJA**, Ruigrok YM, Nederkoorn PJ, van Dijk EJ, Kappelle LJ, Koudstaal PJ, Visser MC, Ferrari MD, Maassen-Van den Brink A, Terwindt GM, Wermer MJH. Sex differences in risk profile, stroke cause and outcome in ischemic stroke patients with and without migraine. *Front Neurosci.* 2021;15:740639.
 9. Ali M, **van Os HJA**, van der Weerd N, Schoones JW, Heymans MW, Kruyt ND, Visser MC, Wermer MJH. Sex differences in presentation of stroke: A systematic review and meta-analysis. *Stroke.* 2022;53:345-354.
 10. **Van Os HJA**, Mulder IA, Van der Schaaf IC, Kappelle LJ, Velthuis BK, Broersen A, Vos JA, Terwindt GM, Schonewille W, Ferrari MD, Algra A, Van Walderveen MAA, Wermer MJH. Role of atherosclerosis, clot extent, and penumbra volume in headache during ischemic stroke. *Neurology.* 2016 Sep 13;87(11).
 11. **Van Os HJA**, Kanning JP, Wermer MJH, Chavannes NH, Numans ME, Ruigrok YM, Van Zwet EW, Putter H, Steyerberg EW, Groenwold RHH. Developing clinical prediction models using primary care electronic health record data: The impact of data preparation choices on model performance. *Frontiers in Epidemiology.* 2022;2.
 12. **Van Os HJA**, Ramos LA, Hilbert A, Van Leeuwen M, Van Walderveen MAA, Kruyt ND, Dippel DWJ, Steyerberg EW, Van der Schaaf IC, Lingsma HF, Schonewille WJ, Majoie CBLM, Olabarragia SD, Zwinderman KH, Venema E, Marquering HA, Wermer MJH. Predicting outcome of intraarterial treatment for acute ischemic stroke using machine learning algorithms. *Front in Neurol.* 2018; 9:784.
 13. **Van Os HJA**, Kanning JP, Ferrari MD, Bonten TN, Vos HMM, Vos RC, Putter H, Groenwold RHH, Wermer MJH. The added value of women-specific and psychosocial risk factors for prediction of stroke in women under 50 years in the general population. *Under revision at Neurology*
 14. **Van Os HJA**, Kanning JP, Bonten TN, Rakers MM, Putter H, Numans ME, Ruigrok YM, Groenwold RHH, Wermer MJH. First-ever cardiovascular event prediction in patients under 50 years using complex data-driven models on routine care data. *Accepted for publication at J American Heart Association*
 15. Van der Weerd N, **van Os HJA**, Ali M, Schoones JW, van den Maagdenberg A, Kruyt ND, et al. Sex differences in hemostatic factors in patients with ischemic

- stroke and the relation with migraine-a systematic review. *Front Cell Neurosci.* 2021;15:711604.
16. Hamming AM, van der Toorn A, Rudrapatna US, Ma L, **van Os HJA**, et al. Valproate reduces delayed brain injury in a rat model of subarachnoid hemorrhage. *Stroke.* 2017 Feb;48(2):452-458.
 17. Hamming AM, Wermer MJ, Umesh Rudrapatna S, Lanier C, **van Os HJA**, et al. Spreading depolarizations increase delayed brain injury in a rat model of subarachnoid hemorrhage. *J Cereb Blood Flow Metab.* 2016 Jul;36(7):1224-31.
 18. Hilbert A, Ramos LA, **van Os HJA**, et al. Data-efficient deep learning of radiological image data for outcome prediction after endovascular treatment of patients with acute ischemic stroke. *Comput Biol Med.* 2019;115:103516.
 19. Ramos LA, Kappelhof M, **van Os HJA**, Chalos V, Van Kranendonk K, Kruyt ND, et al. Predicting poor outcome before endovascular treatment in patients with acute ischemic stroke. *Front Neurol.* 2020;11:580957.
 20. Kappelhof N, Ramos LA, Kappelhof MD, **van Os HJA**, et al. Evolutionary algorithms and decision trees for predicting poor outcome after endovascular treatment for acute ischemic stroke. *Comput. Biol. Med.* 2021;133:104414.
 21. de Hond AAH, Leeuwenberg AM, Hooft L, Kant IMJ, Nijman SWJ, **van Os HJA**, et al. Guidelines and quality criteria for artificial intelligence-based prediction models in healthcare: A scoping review. *NPJ Digit Med.* 2022;5:2.
 22. Silven AV, Petrus AHJ, Villalobos-Quesada M, Dirikgil E, Oerlemans CR, Landstra CP, Boosman H, **van Os HJA**, et al. Telemonitoring for patients with covid-19: Recommendations for design and implementation. *J Med Internet Res.* 2020;22:e20953.

Appendices to all chapters

The appendices to all chapters in this thesis can be found on:
https://bit.ly/thesis_vanos_appendices.

Curriculum Vitae

Hendrikus (Hine) van Os was born on July 12th 1992 in Nieuwkoop, the Netherlands. He attended the Groene Hart Lyceum secondary school in Alphen aan den Rijn, of which the last two years he also participated in the Pre-University College of Leiden University. In 2010, he continued at Leiden University, studying astrophysics. After one year, he switched to a Bachelor's degree in medicine at the Leiden University Medical Center (LUMC), which he combined with an extracurricular programme at the department of Clinical Epidemiology, and a pre-Master's degree in biomedical sciences. In 2012, the MD-PhD programme at the LUMC allowed him to start his research at the department of Neurology, under supervision of prof. dr. M. J. H. Wermer and prof. dr. M. D. Ferrari. During these first years, Hendrikus also graduated cum laude from his classical piano studies at the Royal Conservatory in The Hague. Hendrikus visited the Charité in Berlin, Germany, multiple times in 2015 and 2016 for the study on headache and intrinsic coagulation parameters using the RATIO cohort data, for which he was supervised by dr. B. S. Siegerink. In the summer of 2016 he also visited the Yang Ming Hospital in Taipei, Taiwan, for a study on MRI data of white matter hyperintensities from migraine patients under supervision of prof. S. J. Wang. After finishing his Masters of medicine in 2017, Hendrikus was selected for the MD-PhD grant, which funded the first two years of his PhD program. Under supervision of prof. dr. M. J. H. Wermer, he laid the groundwork for the Hacking Women's Stroke study, for which he later received a Dekker Junior Researcher Grant from the Dutch Heart Foundation in 2020. Also in that year, Hendrikus was awarded the Innovation Grant from the Dutch Heart Foundation after a four-month crowdfunding campaign, during which he collected a total of € 67.000 for the development and implementation of prediction models for stroke. In 2021 he received the ZonMw Gender & Prevention grant for epidemiological research on female-specific risk factors in routine data.

During his PhD research, Hendrikus followed several epidemiology oriented courses to attain his degree in Epidemiologist B after he receives his PhD. From 2020 until now, he also combined his PhD research with the role of general manager at the National eHealth Living Lab (NeLL), under the guidance of prof. dr. N. H. Chavannes. NeLL is part of Public Health and Primary Care department at the LUMC, and its mission is to build future-proof healthcare models through the scientific validation, implementation and upscaling of digital health tools and infrastructures. During his role of general manager, Hendrikus has coordinated multiple consortia including healthcare insurers, software companies, data- and behavioral scientists, doctors, and patients; multidisciplinary collaborations that are urgently needed to realise precision prevention of stroke in women in our healthcare system.

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