

CHIARA HERZOG, PH.D.

Epigenetics | Women's Cancer Prevention and Diagnosis | Translational Science

EDUCATION

2019
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2015

- **University of Edinburgh**
Ph.D. in Neuroscience  Edinburgh, UK
Thesis: Molecular and cellular mechanisms of microglia-mediated neuroprotection
- **University of Edinburgh**
M.Sc by Research in Integrative Neuroscience (distinction)  Edinburgh, UK
Thesis: Molecular characteristion of the synaptic Disks large (Dlg)-associated signalling complex in *Drosophila melanogaster*
- **Innsbruck Medical University**
B.Sc. in Molecular Medicine (distinction)  Innsbruck, AT
 - Graduated from degree top of my class aged 19
 - Joint classes with the medical school
 - Additional courses, e.g., molecular biology, genomics, bioinformatics, statistics

EXPERIENCE

Current
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2020

- **Postdoctoral researcher**
European Translational Oncology Prevention and Screening Institute  University of Innsbruck, AT
 - Lead of computational biology team, in charge of the analysis of high-dimensional omics data for translational risk prediction, prevention, and early detection research
 - Co-PI of a multi-omic human intervention study (TirolGESUND, [NCT05678426](#)) assessing the impact of lifestyle changes on omic biomarkers of disease and aging
 - Developed new biomarkers for detection of women's cancers in non-invasive cervical and buccal samples
 - Teaching and supervision of students and team members

Current
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2023

- **Biomarkers of Aging Consortium**
Executive Committee Member
 - Scientific roadmap development to translate biomarkers of aging into useful clinical tools

Current
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2020

- **Honorary research fellow**
University College London 
London, UK
 - Translational research for women's cancer prediction and prevention

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 chiaraherzog.github.io
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KEY TOPICS

-  epigenetics
-  multiomic human studies
-  disease risk prediction
-  aging research
-  women's cancer

2023
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2022

● **Biomarkers of Aging Consortium Roadmap Group**

Member of core drafting team and organizing committee

- Key involvement in consensus-building for biomarkers of aging for the identification of longevity interventions alongside leading experts (e.g., Vadim Gladyshev, Michael Snyder, Vittorio Sebastian, Steve Horvath)
- Joint first author on three collaborative manuscripts (one of them in lead position; in prep.)
- Coordinating the scientific program for the inaugural Biomarkers of Aging Symposium at The Buck Institute in December 2023

2020
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2019

● **Associate business development manager**

BioClavis, Ltd.

 Glasgow, UK

- Scientific liaison for academic and clinical research collaborations at an omics-based precision diagnostics company

2019
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2019

● **Postdoctoral researcher**

Centre for Discovery Brain Sciences (Dr. Leah Herrgen)

 University of Edinburgh

- Leveraged a transcriptomic dataset I generated previously to investigate immune-derived signaling factors involved in neuroprotection using molecular and computational methods
- Focus: Molecular signalling pathways, gene expression analysis, *in vivo* CRISPR/Cas9 and microscopy, data analysis

2019
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2015

● **Ph.D. researcher**

Centre for Discovery Brain Sciences (Dr. Leah Herrgen)

 University of Edinburgh

- Investigated the role of the immune system in central nervous system repair in a regenerative organism (*D. rerio*) using a variety of molecular, cellular, and computational tools
- Awarded a travelling fellowship for two-month visit to collaborating research institution
- Selected to presentation at scientific conference (the only Ph.D. student to present among senior postdocs and group leaders)
- Focus: Molecular and cellular biology, *in vivo* confocal timelapse microscopy, gene expression analysis using RNA-seq and qRT-PCR, pharmacological and genetic perturbations, computational analysis

2015
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2014

● **Master's student**

Centre for Discovery Brain Sciences (Prof. Seth Grant)

 University of Edinburgh

- Extensive biochemical analysis of evolutionary conservation of large molecular protein complexes at the synapse, comparing *Drosophila*, human, and mouse using co-immunoprecipitation, blue native PAGE, western blotting
- Focus: biochemistry and proteomics

2014
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2014

● **Research assistant**

Division of Neurobiochemistry (Prof. Christine Bandtlow)

 Innsbruck Medical University

- Genotyping, immunohistochemistry and microscopy, biochemistry
- Analysis of Nogo receptor knockout effects on dorsal root ganglia innervation using immunohistochemistry and image analysis

2014
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2014

● **Undergraduate student**

 Innsbruck Medical University

- **Thesis:** Morphological analysis of hair follicles in Nogo receptor knockout mice
- Focus: Genotyping, immunohistochemistry and microscopy, biochemistry
- Identified a critical role for Nogo receptor in innervation of the hairy skin, resulting in a new PhD project

2013
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2012

● **Voluntary internships**

 Innsbruck Medical University

- Division of Neurobiochemistry (Prof. Christine Bandtlow), Jul 2013 - Sept 2013
- Division of Cell Biology (Prof. Lukas Huber), Jun 2012 - Aug 2012

MENTORSHIP AND TEACHING

Current
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2023

- **Cell cycle and tumour biology**
Biology (B.Sc.)  University of Innsbruck
 - Development of new materials and teaching in lecture series relating to cell cycle regulation and tumour biology

Current
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2022

- **Epigenetics and Cancer**
Molecular and Cellular Developmental Biology (M.Sc.)  University of Innsbruck
 - Developed entirely new module to teach translational cancer research, focusing on omic profiling and analysis for personalized cancer risk monitoring and early detection
 - Clinical study design, biomarkers, biobanking, ethics

Current
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2021

- **Mentoring and supervision**
European Translational Oncology Prevention and Screening Institute  University of Innsbruck
 - Formal supervision of up to four team members (postdoctoral researchers, research assistants)
 - Informal mentoring and supervision of Ph.D. student

2019
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2018

- **Laboratory demonstrator**
Cardiovascular Sciences, Microbiology  University of Edinburgh

2019
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2015

- **Mentoring**
Centre for Discovery Brain Sciences  University of Edinburgh
 - Informal mentoring of two master's students, one Ph.D. student, and three undergraduate interns

PUBLICATIONS

[§] contributed equally, [†] corresponding author, ★ highlighted

2024

- **Association of clinicopathological features and outcomes of the WID-qEC epigenetic test in cervicovaginal self-samples and endometrial cancer and adjacent normal tissue**
Journal of the National Cancer Institute, (*submitted*)
Herzog C, Redl E, Martinez JM, Paytubi S, Matias-Guiu X, Ponce J, Alemany L, Costas L, Widschwender M
- **Functional epigenetic clocks reveal discordant tissue aging in cancer cases**
PNAS Nexus, (*under review*)
Herzog C, Redl E, Barret J, Aminzadeh-Gohari S, Weber DD, Tevini J, Lang R, Kofler B, Widschwander M
- **Biomarkers of Aging: Challenges and Recommendations for Their Translation**
Nature Aging, (*under review*)
Herzog C[§], Goeminne L[§], Paganik JR[§], Barzilai N, Belsky DW, [...] & Gladyshev VN
- **Cell- and exposure-specific DNA methylation changes in response to cigarette smoking indicate shared carcinogenic mechanisms with e-cigarette use**
Cancer Research, (*accepted*)
Herzog C, Jones A, Evans I, Raut JR, Zikan M, Cibula D, Wong A, Brenner H, Richmond RC, Widschwander M

- 2023
- **A framework for validation of omic biomarkers of aging**
Nature Medicine, (accepted)
Moqri M[§], Herzog C[§], Paganik JR[§], Kejun Y, Justice J, Belsky DW, [...] & Ferucci L
 - **Performance of the WID-qEC test versus sonography to detect uterine cancers in women with abnormal uterine bleeding (EPI-SURE): a prospective, consecutive observational cohort study in the UK**
Lancet Oncology, 2023; doi: 10.1016/S1470-2045(23)00466-7
Evans I[§], Reisel D[§], Jones A[§], Bajrami A[§], Nijjar S, Solangon SA, Arora R, Redl E, Schreiberhuber L, Ishaq-Parveen I, Rothärmel J, Herzog C, Jurkovic D, Widschwendter M
 - **Plasma cell-free DNA methylation analysis for ovarian cancer detection: Analysis of samples from a case-control study and an ovarian cancer screening trial**
International Journal of Cancer, 2023; 1-13; doi: 10.1002/ijc.34757
Herzog C, Jones A, Evans I, Reisel D, Olaitan A, Doufekas K, [...] & Widschwendter M
 - **Devising reliable and accurate epigenetic clocks: choosing the optimal computational solution**
bioRxiv, 2023; doi: 10.1101/2023.10.13.562187
Vavourakis CD, Herzog C^{§†} & Widschwendter M^{§†}
 - **DNA methylation at quantitative trait loci (mQTLs) varies with cell type and nonheritable factors and may improve breast cancer risk assessment**
npj Precision Oncology, 2023, 7(1), 99; doi: 10.1038/s41698-023-00452-2
Herzog C, Jones A, Evans I, Zikan M, Cibula D, Harbeck N, [...] & Widschwendter M
 - ★ ● **Biomarkers of aging for the identification and evaluation of longevity interventions**
Cell, 2023, 186(18), 3758-3775; doi: 10.1016/j.cell.2023.08.003
Moqri M[§], Herzog C[§], Paganik J R[§], Justice J, Belsky DW, Higgins-Chen A, [...] & Gladyshev VN
 - **HPV-induced host epigenetic reprogramming is lost upon progression to high-grade cervical intraepithelial neoplasia**
International Journal of Cancer, 2023, 152(11), 2321-2330; doi: 10.1002/ijc.34477
Herzog C[§], Vavourakis CD[§], Barrett JE, Karbon G, Villunger A, Wang J, [...] & Widschwendter M
 - **The WID-EC test for the detection and risk prediction of endometrial cancer**
International Journal of Cancer, 2023, 152(9), 1977-1988; doi: 10.1002/ijc.34406
Barrett J E[§], Jones A[§], Evans I[§], Herzog C[§], Reisel D, Olaitan A, [...] & Widschwendter M
 - **Technical and biological sources of unreliability of Infinium type II probes of the Illumina MethylationEPIC BeadChip microarray**
bioRxiv, 2023; doi: 10.1101/2023.03.14.532595
Nazarenko T, Vavourakis CD, Jones A, Evans I, Watson A, Brandt K, [...] Herzog C^{§†} & Widschwendter M^{§†}
 - **The WID-qEC test: Performance in a hospital-based cohort and feasibility to detect endometrial and cervical cancers**
International Journal of Cancer, 2023, 152(6), 1269-1274, doi: 10.1002/ijc.34275
Schreiberhuber L, Herzog C, Vavourakis CD, Redl E, Kastner C, Jones A, [...] & Widschwendter M

2022

- **DNA methylation-based detection and prediction of cervical intraepithelial neoplasia grade 3 and invasive cervical cancer with the WID™-qCIN test**
Clinical Epigenetics, 2022, 14(1), 1-12; doi: 10.1186/s13148-022-01353-0
Herzog C[§], Sundström K[§], Jones A, Evans I, Barrett JE, Wang J, [...] & Widschwendter M
- **The WID-CIN test identifies women with, and at risk of, cervical intraepithelial neoplasia grade 3 and invasive cervical cancer**
Genome Medicine, 2022, 14(1), 1-11; doi: 10.1186/s13073-022-01116-9
Barrett JE, Sundström K, Jones A, Evans I, Wang J, Herzog C, [...] & Widschwendter M
- **Dietary restriction in senolysis and prevention and treatment of disease**
Critical Reviews in Food Science and Nutrition, 2022, 1-27; doi: 10.1080/10408398.2022.2153355
Aminzadeh-Gohari S, Kofler B & Herzog C[†]
- **A simple cervicovaginal epigenetic test for screening and rapid triage of women with suspected endometrial cancer: validation in several cohort and case/control sets**
Journal of Clinical Oncology, 2022, 40(33), 3828; doi: 10.1200/JCO.22.00266
Herzog C[§], Marín F[§], Jones A, Evans I, Reisel D, Redl E, [...] & Widschwendter M
- **Antiprogestins reduce epigenetic field cancerization in breast tissue of young healthy women**
Genome Medicine, 2022, 14(1), 64; doi: 10.1186/s13073-022-01063-5
Bartlett TE, Evans I, Jones A, Barrett JE, Haran S, Reisel D, Papaikonomou K, Jones L, Herzog C, [...] & Widschwendter M
- **Susceptibility to hormone-mediated cancer is reflected by different tick rates of the epithelial and general epigenetic clock**
Genome Biology, 2022, 23(1), 52; doi: 10.1186/s13059-022-02603-3
Barrett JE[§], Herzog C[§], Kim YN[§], Bartlett TE, Jones A, Evans I, [...] & Widschwendter M
- **The WID-BC-index identifies women with primary poor prognostic breast cancer based on DNA methylation in cervical samples**
Nature Communications, 2022, 13(1), 449; doi: 10.1038/s41467-021-27918-w
Barrett JE[§], Herzog C[§], Jones A, Leavy OC, Evans I, Knapp S, [...] & Widschwendter M
- **The DNA methylome of cervical cells can predict the presence of ovarian cancer**
Nature Communications, 2022, 13(1), 448; doi: 10.1038/s41467-021-26615-y
Barrett JE, Jones A, Evans I, Reisel D, Herzog C, Chindera K, [...] & Widschwendter M
- **RNA-seq analysis and compound screening highlight multiple signalling pathways regulating secondary cell death after acute CNS injury in vivo**
Biology Open, 2020, 9(5), bio050260; doi: 10.1242/bio.050260
Herzog C[§], Greenald D[§], Larraz J, Keatinge M & Herrgen L
- **Rapid clearance of cellular debris by microglia limits secondary neuronal cell death after brain injury in vivo**
Development, 2019, 146(9), dev174698; doi: 10.1242/dev.174698
Herzog C, Pons Garcia L, Keatinge M, Greenald D, Moritz C, Peri F & Herrgen L

2020

2019

INVITED TALKS

- 2024 • **Biomarkers of Aging for Geroscience Interventions**
Joint Annual Congress of the German Societies for Gerontology & Geriatry  Kassel, DE
- 2024 • **Panelist at 'A shared definition of longevity medicine in Italy' session**
Milan Longevity Summit  Milan, IT
- 2024 • **Harnessing the epigenome for personalized disease prevention**
Turn Around Aging Conference  Munich, DE
- 2024 • **Biomarkers of Aging for the Identification of Longevity Interventions**
From Aging Medicine to Longevity Medicine, Driven by Technologies
Invited to present work at an event of the Italian Government  Rome, IT
- 2023 • **Smoking Elicits Distinct Epigenetic Alterations in Epithelial and Immune Cells**
Integrative Cancer Epidemiology Programme Meeting  Bristol, UK
- 2022 • **Harnessing the epigenetic footprint of cervical samples for breast and ovarian cancer detection and prediction**
Young European Scientist Meeting
I was an invited keynote speaker presenting alongside highly esteemed researchers, such as Nobel Prize winners Prof. Drew Weissman and Prof. William Kaelin  Porto, PT
- 2022 • **Monitoring lifestyle intervention on the human exposome – the HEAP lifestyle cohort**
Frontiers in Human Exposome Research  Graz, AT
- 2022 • **Harnessing the epigenetic footprint of cervical samples for breast and ovarian cancer detection and prediction**
British Association for Cytopathology

CONFERENCE TALKS

- 2023 • **GRC Biology of Aging**
Biomarkers of Aging Consortium - Establishing Reliable Biomarkers of Aging
Herzog C, Moqri M  Castelldefels, ES
- 2023 • **European Human Exposome Network Scientific Meeting**
Smoking elicits distinct epigenetic changes in epithelial and immune cells
Herzog C, Widschwendter M  Leuven, BE
- 2022 • **CSHL Mechanisms of Aging**
Discordance in general and epithelial ageing signatures indicates hormone-mediated cancer risk
Herzog C, Widschwendter M  Cold Spring Harbor, New York
- 2022 • **Epigenetics of Ageing**
Discordance in general and epithelial ageing signatures indicates hormone-mediated cancer risk  Mainz, DE
Herzog C, Widschwendter M; note: *talk selected from abstracts, could not participate due to COVID-19*
- 2022 • **European Human Exposome Network Scientific Meeting**
Exposures and the epigenome: linking the environment with inherited risk factors
Herzog C, Widschwendter M  Barcelona, ES

- 2018 • **Macrophages Satellite Symposium**
Microglia limit secondary cell death following brain injury
Herzog C, Herrgen L📍 Edinburgh, UK
- 2018 • **Cardiovascular Sciences–Neuroscience Network Launch**
Towards identifying mechanisms of inflammatory neuroprotection
Herzog C, Herrgen L📍 Edinburgh, UK
- 2017 • **Centre for Integrative Physiology – Centre for Neuroregeneration Symposium**
Microglia limit secondary cell death following brain injury
Herzog C, Herrgen L📍 Edinburgh, UK
- 2017 • **ImmuneFish**
Microglia limit secondary cell death following brain injury
Herzog C, Herrgen L; note: *only PhD student to present among senior postdocs and group leaders*📍 Edinburgh, UK

🔗 AWARDS

- 2023 • **Prof. Ernst Brandl Prize**
Ernst Brandl Stiftung📍 Schwaz, AT
Prize awarded annually or biannually for innovative, forward-looking achievements that help to overcome the difficulties of our time
- 2020 • **Falling Walls Lab Austria Winner**
Falling Walls Lab📍 Innsbruck, AT
Winner of Falling Walls Lab Scientific idea competition (Austria), Finalist for global event
- 2018 • **Runner up Student Publication of the Year**
Scottish Newspaper Society📍 Glasgow, UK
Awarded to the Edinburgh University Science magazine, of which I was editor and president at the time
- 2017 • **Best Short Talk (Runner Up)**
Centre For Integrative Physiology-Centre For Neuroscience📍 Edinburgh, UK

☰ FUNDING

- 2023 • **FEBS Travel Grant**
Federation of European Biochemical Sciences📍 Cambridge, UK
- 2018 | 2015 • **Ph.D. scholarship**
University of Edinburgh📍 Edinburgh, UK
Highly competitive full tuition scholarship
- 2017 • **FASEB Journal Travelling Fellowship**
Federation of American Societies for Experimental Biology Journal
- 2016 • **Company of Biologists Travelling Fellowship**
Company of Biologists📍 Cambridge, UK
Competitive travelling fellowship to enable a new collaborative project and fund a two-month exchange to collaborator's institution

2015
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2014

- **Land Tirol Scholarship for Stays Abroad**
Land Tirol
funding for particularly talented students for study stays at special scientific or university institutions abroad
📍 Innsbruck, Austria

Current
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2023

💼 OTHER EXPERIENCE AND ACTIVITIES

2022
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2021

- **Scientific board member**
Aeon Foundation
• Member of scientific board at foundation aimed at translating the latest scientific research in the field of technologically driven longevity into policies capable of extending human life and improving quality of life
📍 Brussels, BE/Rome, IT

2019
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2016

- **Pint of Science - City Coordinator**
Pint of Science Austria
• Organised the first Innsbruck edition of the international Pint of Science festival; recruited and led 10+ team members, and organised/presented in the 'Tech Me Out' series
• Interviewed on national TV and radio
• 14/15 events sold out
• Coordinated sponsoring, merchandising, and press for events
📍 Innsbruck, AT
- **Edinburgh University Science Magazine**
President / Editor / Contributor
• Represented and managed student-run science magazine
• Authored new articles, including on topics such as personalised medicine, medical ethics, edited incoming articles
• Contributed to idea conceptualisation for new issues
📍 Edinburgh, UK

2019
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2018

- **Freelance editor**
Cactus Communications
• Edited and reviewed scientific manuscripts in the area of molecular genetics and biomedical research for publication under tight deadlines

2017
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2016

- **Pint of Science - Team Leader**
Pint of Science UK
• Approached key scientists in the field to present their work to a lay audience as part of the Pint of Science festival
• Demonstrated excellent leadership and management skills
• All events sold out
📍 Edinburgh, UK

📋 SELECTED PRESS AND MEDIA

2023

- **Twelve Tyrolean Rays of Light – People of Tomorrow**
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📍 Innsbruck, AT

2023

- **Tech & Science Daily: Womb cancer 2023 test breakthrough ‘cuts diagnosis time’**
The Standard
Newspaper article and [podcast](#)
📍 London, UK

2023

- **Tyrolean Medical Researcher Develops Test for the Detection of Uterine Cancer**
Tirol TV
[TV interview](#) and newspaper article
📍 Innsbruck, AT