Scientific contributions to selected Health topics

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I offer epidemiology, data analysis in R and clinical-biological interpretation as a scientific partner. The eight profiles below describe how I can contribute to exposome research, antiviral and antimicrobial development, chronic disease interventions, neurodegenerative disease trials, AI-enabled biomarkers, healthcare AI and Virtual Human Twins.

Climate exposures and the human exposome

HORIZON-HLTH-2027-01-ENVHLTH-02

Integrating climate-related exposures into the human exposome and characterising its changes in response to climate change

I am a physician and public health researcher working at the interface of environmental epidemiology, molecular biomarkers and population health. My research includes temperature and cognitive function, particulate air pollution, inflammatory and cortisol responses, mitochondrial DNA copy number and epigenetic ageing. I can contribute epidemiological study design, longitudinal data analysis and clinically informed interpretation of exposure and biomarker findings, helping connect environmental measurements with biological responses and health outcomes.

- Environmental and molecular epidemiology; repeated measurements; mixed models; confounding and effect modification.
- Integration and interpretation of exposure, clinical, lifestyle and biomarker variables.

Contribution I can offer I can help develop analysis plans, harmonise study variables, analyse exposure-response relationships and identify susceptible groups. Potential outputs include an epidemiological protocol, reproducible R analyses, sensitivity analyses and scientific publications.

Collaboration sought Exposome consortia, environmental modellers, biomarker laboratories and cohort teams.

Relevant publications [1], [2], [3].

Antiviral development and epidemic preparedness

HORIZON-HLTH-2027-01-DISEASE-05

Development of novel small molecule antiviral therapeutics for pathogens with epidemic potential

I can contribute epidemiological methods, evidence synthesis and clinical-biological interpretation to antiviral development consortia. My published work includes spatio-temporal modelling of SARS-CoV-2 infections and research on molecular regulation, oxidative processes and epigenetics. This background can support the interpretation of population susceptibility and host-response evidence, and help connect experimental questions with clinically meaningful outcomes and public health needs.

- Infectious disease epidemiology, surveillance data and critical assessment of observational evidence.
- Understanding of molecular mechanisms and clinical context; systematic reviews and quantitative synthesis.

Contribution I can offer I can contribute to evidence reviews, epidemiological rationale, outcome definitions and statistical analysis of relevant clinical or observational datasets. I would work alongside virology, medicinal chemistry and pharmacology teams responsible for antiviral discovery and development.

Collaboration sought Antiviral consortia seeking epidemiology, statistics or translational interpretation support.

Relevant publications [4], [12].

Innovative antimicrobials and resistant pathogens

HORIZON-HLTH-2027-01-DISEASE-08

Development of innovative antimicrobials against pathogens resistant to antimicrobials

I combine hospital hygiene and public health practice with research on antimicrobial use, healthcare-associated infections and the evaluation of an experimental Raman-based bacterial detection technology. I can contribute epidemiological study design, analysis of hospital datasets and clinically informed interpretation of antimicrobial resistance research. My contribution can help connect laboratory innovation with relevant infection outcomes, patient populations and antimicrobial stewardship needs.

- Healthcare-associated infection surveillance, surgical prophylaxis and WHO AWaRe and DDD analyses.
- Statistical evaluation of diagnostic prototypes and interpretation of infection prevention evidence.

Contribution I can offer I can help define target populations and endpoints, develop data collection and analysis plans, and analyse infection and prescribing patterns. I can support evidence synthesis and the clinical relevance of evaluation studies alongside microbiology and antimicrobial development teams.

Collaboration sought Antimicrobial developers, clinical microbiology laboratories, hospitals and stewardship researchers.

Relevant publications [5], [6], [7].

Healthcare interventions for chronic diseases

HORIZON-HLTH-2027-02-DISEASE-01-two-stage

Innovative healthcare interventions for non-communicable diseases

I offer epidemiological and statistical expertise for evaluating prevention and healthcare interventions for chronic diseases. My research covers asthma and dietary patterns, cardiometabolic conditions, lung cancer screening, molecular markers of cancer risk and inequalities in healthcare access. I can help define relevant outcomes, analyse population and healthcare datasets, and interpret findings in relation to clinical practice, prevention and equitable access.

- Population surveys, weighted regression in R, multivariable and multilevel analyses.
- Risk factor assessment, screening policy mapping, systematic reviews and meta-analyses.

Contribution I can offer I can contribute protocols and analysis plans, outcome and covariate definitions, subgroup and sensitivity analyses, and evaluation of inequalities. I can support interpretation of intervention findings and implementation indicators in collaboration with disease-specific clinical and intervention teams.

Collaboration sought Clinical and prevention consortia seeking epidemiology, data analysis and evaluation expertise.

Relevant publications [8], [9], [10].

Trials for neurodegenerative diseases

HORIZON-HLTH-2027-02-DISEASE-14-two-stage

Clinical trials for advancing innovative interventions for neurodegenerative diseases

I can contribute epidemiological and methodological support to neurodegenerative disease trial teams. My relevant research examines cognitive function in older adults, environmental susceptibility, mitochondrial DNA copy number and epigenetic ageing. This provides a basis for supporting analyses of heterogeneity, biological ageing and candidate biomarkers, while helping distinguish exploratory findings from measures suitable for clinical decision-making.

- Analysis of repeated cognitive measurements and ageing-related molecular biomarkers.
- Clinical interpretation, confounding assessment, effect modification and evidence synthesis.

Contribution I can offer With neurologists and trial methodologists, I can contribute to analysis plans, covariate selection, longitudinal outcome analysis and exploratory biomarker substudies. My proposed role is methodological and epidemiological, complementing teams responsible for disease-specific care and trial delivery.

Collaboration sought Neurology trial consortia, ageing cohorts and biomarker groups seeking analytical collaboration.

Relevant publications [1], [2].

Predictive biomarkers using AI

HORIZON-HLTH-2027-02-TOOL-01-two-stage

Development of predictive biomarkers of disease progression and treatment response by using AI methodologies for chronic non-communicable diseases

I offer molecular epidemiology, biostatistics and clinical-biological interpretation for AI-enabled biomarker projects. My work includes DNA methylation age metrics, mitochondrial DNA copy number, lung cancer biomarker evidence and participation in a mechanistic epigenetics study. I can help translate candidate biological signals into clearly defined clinical questions and rigorous evaluation plans, working with AI developers and clinical cohorts.

- Integration of clinical, exposure and molecular variables; longitudinal modelling and quantitative evidence synthesis.
- Critical appraisal of biomarker associations, assay context, confounding and clinical relevance.

Contribution I can offer I can support endpoint and predictor definitions, dataset quality review and clinically informed assessment of validation results. For progression or treatment-response projects, I would help design the necessary longitudinal or treatment-specific evaluation, building on my prior work on ageing and disease risk.

Collaboration sought AI and omics teams, biobanks and clinical cohorts seeking molecular epidemiology expertise.

Relevant publications [2], [10], [11], [12].

Frontier AI models for healthcare

HORIZON-HLTH-2027-03-TOOL-08

Towards the next generation of frontier Artificial Intelligence models for healthcare

I can contribute clinical and epidemiological expertise to the development and evaluation of advanced healthcare AI. My research includes statistical classification in an experimental machine learning Raman-based bacterial detection study, analysis of population and hospital data, and systematic assessment of virtual reality tools for visual function. I can help formulate clinically meaningful use cases and assess data quality, representativeness and the interpretation of model performance.

- Clinical and public health use-case definition; dataset interpretation and evidence appraisal.
- Statistical evaluation of diagnostic technologies and integration of molecular and clinical knowledge.

Contribution I can offer I can support outcome definitions, comparison with clinical reference standards, subgroup evaluation and interpretation of errors and generalisability. I would contribute the clinical, epidemiological and evaluation components alongside teams responsible for model architecture, training and computational infrastructure.

Collaboration sought Healthcare AI developers, hospitals and technology validation consortia.

Relevant publications [5], [7], [13].

Virtual Human Twins for prevention and diagnosis

HORIZON-HLTH-2027-03-TOOL-04

Virtual Human Twins (VHTs) for integrated clinical decision support in prevention and diagnosis

I offer epidemiological methods and clinical-biological interpretation to support Virtual Human Twin projects. My research links environmental exposures, cognitive function, molecular ageing and disease risk, using longitudinal cohorts and population data. I can help define prevention and diagnostic questions, select relevant clinical and biological variables, and assess whether model outputs correspond to observed health outcomes. My proposed contribution connects patient data and biological plausibility with the evaluation of personalised decision support.

- Longitudinal analysis of clinical and molecular measurements; assessment of heterogeneity, confounding and effect modification.
- Interpretation of exposure and biomarker data in relation to ageing, cognition, cancer risk and prevention.

Contribution I can offer I can contribute data dictionaries, analysis plans and outcome definitions; support integration of clinical, exposure and molecular variables; and analyse agreement between model outputs and observed outcomes. I would work with computational modelling teams on validation protocols, subgroup analyses and clinical interpretation.

Collaboration sought VHT developers and clinical consortia seeking epidemiological support for data integration and validation, particularly in ageing, chronic disease and exposome research.

Relevant publications [1], [2], [9], [10].

Selected publications

Publications supporting the scientific expertise and proposed contributions described in the topic profiles. Bracketed numbers refer to the preceding sections.

[1] Age and mitochondrial DNA copy number influence the association between outdoor temperature and cognitive function. Environmental Epidemiology, 2020. https://doi.org/10.1097/EE9.0000000000000108

[2] Mitochondria and aging in older individuals: an analysis of DNA methylation age metrics, leukocyte telomere length, and mitochondrial DNA copy number in the VA normative aging study. Aging, 2020. https://doi.org/10.18632/aging.102722

[3] Association between TNF-alpha, cortisol levels, and exposure to PM10 and PM2.5: a pilot study. Environmental Sciences Europe, 2024. https://doi.org/10.1186/s12302-024-00961-2

[4] Atmospheric particulate matter effects on SARS-CoV-2 infection and spreading dynamics: A spatio-temporal point process model. Environmental Research, 2022. https://doi.org/10.1016/j.envres.2022.113617

[5] Accuracy of a novel Raman-based technology for the early detection of multidrug-resistant bacteria. IEEE MeMeA proceedings, 2022. https://doi.org/10.1109/MeMeA54994.2022.9856540

[6] Antibiotic Use in Surgical Wards: A Point Prevalence Survey Based on the WHO AWaRe Methodology. Antibiotics, 2026. https://doi.org/10.3390/antibiotics15010012

[7] Point prevalence survey of antibiotic use and healthcare-associated infections in acute care hospitals: a comprehensive report from the Marche Region of Italy. Journal of Hospital Infection, 2023. https://doi.org/10.1016/j.jhin.2023.07.025

[8] Exploratory Food-Frequency Scores and Self-Reported Asthma in Italian Adults: A Nationwide Cross-Sectional Study. Nutrients, 2026. https://doi.org/10.3390/nu18213485

[9] Lung Cancer Screening in Adults: State-of-the-Art and Policy Mapping (2025). Cancers, 2026. https://doi.org/10.3390/cancers18040596

[10] Methylation Biomarkers of Lung Cancer Risk: A Systematic Review and Meta-Analysis. Cancers, 2025. https://doi.org/10.3390/cancers17040690

[11] Mitochondrial DNA Copy Numbers and Lung Cancer: A Systematic Review and Meta-Analysis. International Journal of Molecular Sciences, 2025. https://doi.org/10.3390/ijms26146610

[12] Targeted DNA oxidation by LSD1-SMAD2/3 primes TGF-beta1/EMT genes for activation or repression. Nucleic Acids Research, 2020. https://doi.org/10.1093/nar/gkaa599

[13] Virtual Reality for the Assessment of Visual Capacities: A Systematic Review. Applied Sciences, 2026. https://doi.org/10.3390/app16157788