

Integrating Ecotoxicity in Early-Stage Drug Development



OneHealthdrugs Stakeholder Meeting



Date: 7 July 2024

Venue: COST Association Premises, Brussels



**Funded by
the European Union**

COST Action CA21111 – One Health Drugs Against Parasitic Vector-Borne Diseases (OHD)

Date: 7 July 2024

Venue: COST Association Premises, Brussels - 23rd floor of the Manhattan Center, Avenue du Boulevard – Bolwerklaan 21, 1210 Brussels

Format: In-person meeting

AGENDA

10:15-10:30

Registration and Welcome Coffee

10:30-10:45

Opening Remarks and Objectives of the Meeting

Wioleta Walentowska OneHealthdrugs Action Scientific Officer

Maria Paola Costi – Chair of the OHD COST Action, University of Modena and Reggio Emilia

- Welcome note and objectives of the session – Show the video for starting)
- Importance of addressing ecotoxicity early in the drug development process very short + cost action

10:45-11:50

Session 1: Environmental Impact of Pharmaceuticals

- Pharmaceutical pollution and its role in biodiversity loss and antimicrobial resistance
- Specific risks linked to veterinary and human medicine in the context of parasitic/vector-borne parasitic diseases and antiparasitic drugs

Invited Expert in environmental toxicology/ecology

Andrei Daniel MIHALCA DVM, MSc, PhD, DipECZM (Wildlife Population Health) WAAVP as a secretary.

Pablo Sagredo Martin (One Health Officer, United Nations Environment Programme (UNEP))

Janyl Moldalieva (Policy Officer at the United Nations Environment Programme (UNEP))

Environmental Impact of Pharmaceuticals: Implications for Biodiversity and Antimicrobial Resistance

*Elisa Uliassi*¹ and *Clara Lima*² Department of Pharmacy and Biotechnology, University of Bologna Italy², Institute for Research and Innovation in Health, University of Porto, Portugal

A Young Researcher's Perspective on the Early Integration of Ecotoxicity into Drug Discovery and Development for Vector-Borne Parasitic Diseases

discussion

MPCosti sum up use the board

11:50-12:30

Round table discussion 1 all invited. Voices from Industry, Human and Veterinary Sciences

- Current practices and challenges
- Open questions addressed by pharmaceutical companies, human and veterinary drug developers.

Discussants

Thomas Geurden (Head of Parasitology Research at Zoetis)

Environmental risk assessment of veterinary medicines: A global perspective

Eleni Chontzopoulou (Cloudpharm, Athens, Gr)

AI for a Safer Environment: Cloudpharm's Role in Predicting and Mitigating Ecotoxicity of Pharmaceuticals

Ludwig-Erdmann, Carolin

Elanco Animal Health GmbH Monheim - Germany (D)

Moderated by M.Paola Costi - sum up – use the board

12:30-13:30

Lunch Break and Informal Networking

13:30 – 14:45

Session 2:

Round table discussion 2 [All invited](#). Current Regulatory, One Health Gaps and Perspectives

Regulatory agency representatives will introduce the session.

- Role of the EU Commission, Parliament, and DGs
- Insights from EMA/FDA/OECD on integration of ecotoxicity
How to shape a regulatory roadmap within One Health frameworks.

Discussants

Bruno Nunes (Universidade de Aveiro - Centro de Estudos do Ambiente e do Mar, Aveiro - Portugal (PT))

Point of view of a double edge sword expert - regulatory experience vs. ecotoxicology of pharmaceutical drugs

R. Carpeto Area Environmental Risk Assessment, Agencia Española de Medicamentos y Productos Sanitarios (AEMPS) - Spain (ES)

Parasiticides in the environment: Challenges in the authorisation.

Moderated by T. Zacharis

Paola: sum-up

14:45 – 16:00

Session 3: Action Points

Summary and adjourn

- Key takeaways and consensus points
- Proposal for a working group to develop a joint guideline
- Setting a timeline for follow-up activities

Activity

Paola and Theo use the blackboard – show the recommendation letter we can see (European Environmental Bureau- EEA)

10' Please map people you think should be motivated (give sheets and pen to write on and then collect)

15'

Policy brief.

To whom should we distribute?

Could you help the distribution?

10'

Who does want to be involved in the second step?

Do you want to be included?

Who do you think is missing today as a profile?

16:00 Closing Remarks and Thank You

ATTENDANTS

Jose Maria ALUNDA RODRIGUEZ

Complutense University of Madrid (UCM) - Spain (ES)

Maria Paola Costi
University of Modena and Reggio Emilia - Italy (IT)
OneHealthdrugs Action Chair

Theodora Calogeropoulou
National Hellenic Research Foundation Athens– Greece (EL)

Ricardo CARAPETO GARCÍA
Area Environmental Risk Assessment, Agencia Española de Medicamentos y Productos Sanitarios (AEMPS)
- Spain (ES)

Eleni Chontzopoulou
Cloudpharm – Greece (EL)

Anabela Cordeiro-da-Silva
Faculty of Pharmacy, University of Porto- Portugal (PT)
OneHealthdrugs Action vice-Chair

Thomas Geurden
Zoetis Belgium - Belgium (B)
Clara Lima
I3s - Instituto De Investigacao E Inovacao Em Saude, University of Porto - Portugal (PT)

Ludwig-Erdmann, Carolin
Elanco Animal Health GmbH, Monheim - Germany (D)

Andrei Mihalca
Association for the Advancement of Veterinary Parasitology (WAAVP)

Olatunji Nasir ([potential remote participation](#))
World Veterinary Association (WVA) Medicines Stewardship Working Group

Bruno Nunes
Universidade de Aveiro - Centro de Estudos do Ambiente e do Mar, Aveiro - Portugal (PT)

Eugenia Oliveri
Experimental Zooprophyllactic Institute of Sicily, Palermo - Italy (IT)

Elisa Uliassi
Alma Mater Studiorum, University of Bologna - Italy (IT)

Wioleta Walentowska
OneHealthdrugs COST Action Scientific Officer

Janyl Moldaliev
United Nation Environmental Programme

Pablo Sagredo Martin ([remote participation](#))
United Nation One Health Programme

Theo Zacharis
Greek Scientists Society - Greece (EL)

David John
Senior Technical Manager of AnimalhealthEurope.

ABSTRACTS & PROFESSIONAL PROFILES

Thomas Guarden

Zoetis Belgium - Belgium (B)

Environmental risk assessment of veterinary medicines: A global perspective

Environmental risk assessment has become an integrated part of any product development in veterinary medicine. Since the 1980's guidelines have been established by different regulatory authorities and by VICH. Increased awareness around potential contamination of the environment has triggered discussions around additional guidance for companion animals and aquaculture. Whereas before, an environmental risk assessment was usually performed later in the development cycle, the increased awareness around the environmental risk has triggered earlier investigations of potential toxic effects.

CV and current role: Thomas Geurden obtained a DVM degree and a PhD from the Ghent University (Belgium) and is a board-certified specialist from the European Veterinary Parasitology College. At Zoetis, Thomas is Senior Director in Global Therapeutics, and leads the Parasitology Research Team. Besides parasitology, Thomas is passionate about outdoor activities and travel.

Andrei Daniel MIHALCA

DVM, MSc, PhD, DipECZM (Wildlife Population Health). Secretary WAAVP.

Professional background is parasitology. Discussion during the meeting could involve the potential collaboration between this COST Action and WAAVP.

I think it may also be relevant that I understand the COST principles, as I was the Chair or a COST Action in the recent past.

I think the most relevant is related to our Guidelines:

<https://www.waavp.org/education/published-guidelines.html>

Bruno Nunes

Universidade de Aveiro - Centro de Estudos do Ambiente e do Mar, Aveiro - Portugal (PT)

Point of view of a double edge sword expert - regulatory experience vs. ecotoxicology of pharmaceutical drugs

My field of expertise and past scientific activity is the study of adverse effects of drugs in the wild, especially focusing on the use, development and implementation/validation of ecotoxicological biomarkers of different types. These include neurotoxicity, energy balance, antioxidant defense, detoxification metabolism, behavior, histology, epigenetics, but also the use of standard ecotoxicological tools, some of which are inscribed in regulatory guidelines from EMA (including the now adopted Guideline on the environmental risk assessment of medicinal products for human use EMEA/CHMP/SWP/4447/00 Rev. 1- Corr.*, 22 August 2024). I also work as an expert at INFARMED, the Portuguese national authority of medicines and health products, in the assessment of dossiers for the marketing authorization of human use drugs. I am also involved in the group of interest of the professional order of pharmacists in Portugal, in the scope of the environmental impact of human use drugs. My professional background as an ecotoxicologist, from the general field of biomarkers in ecotoxicology, allows me to understand the molecular basis of the toxic response in many taxa, and the

recognition that ecotoxicological effects are not limited to those inscribed in regulatory documents. These should include this perspective of biomarker-based assays in a near future, despite the recent revision of the guideline issued by EMA in August 2024, that states that the evaluation of biomarkers may provide additional information for the interpretation of effects from apical endpoints but should not be used for the derivation of PNECs. The use of biomarkers is envisaged in this recently adopted guideline, but only as a tool to identify putative mechanisms of toxic action, which is rather limiting and not completely protective of the aquatic environment. Therefore, my contribute will be focus mainly on evidencing situations in which the ecotoxicological evaluation of the adverse effects of pharmaceutical drugs would certainly benefit from integration of biomarker data in assessment studies.

Bruno Nunes (BN) graduated in Pharmaceutical Sciences from the Faculty of Pharmacy (1999) and completed his PhD in Biomedical Sciences (2005), from the Abel Salazar Institute of Biomedical Sciences, both at the University of Porto. BN holds an Aggregation degree in Biology from the University of Aveiro (2020). BN was an assistant professor at the Jean Piaget School of Health (2004), and an assistant professor at the Fernando Pessoa University (UFP) until January 2013. BN is an integrated member of the Center for Environmental and Marine Studies (CESAM), and a Principal Researcher with Habilitation at the Department of Biology at the University of Aveiro since 2005. BN, h-index = 46, 6305 citations, consulted on 3/7/2025), author of 142 research articles (published in international peer-reviewed journals, mostly as first, last or corresponding author), 3 book chapters, and 9 research articles in national journals. For 2 consecutive years, BN has appeared in the lists of the most cited and influential researchers at a global level, according to Stanford-Elsevier University metrics (data available at <https://www.ua.pt/en/news/16/72610>; <https://www.ua.pt/en/news/11/78372>). BN has participated in 18 scientific projects; among these, he was the PI (or responsible for the participation of the University of Aveiro) in 7 of them (2 ongoing). BN has been involved with the private sector, leading the University of Aveiro's participation in a consortium with private companies in the plastics manufacturing area. BN was the PI and special visiting researcher of a Brazilian project (funded by CAPES) and is now a member of the Brazil-Norway Biodiversity Research Consortium project. BN was also the main promoter of an industry-oriented R&D project funded by the Agência de Inovação (ANI). BN supervised/supervises 3 post-doctoral trainees, 9 PhD students and 43 master's students, 4 research initiation students, 13 monographs, 2 research technicians, 34 undergraduate students, and 6 interns. BN is an expert in national and international organizations, including the Commission for the Evaluation of Pharmaceutical Medicines, INFARMED, National Authority for Medicines and Health Products (Ministry of Health, Portugal); Veterinary Medicines Evaluation Group (Ministry of Agriculture, Portugal); Foundation for Science and Technology (Ministry of Science, Portugal); Agency for Innovation (Ministry of Economy, Portugal); European Food Safety Authority/European Food Safety Agency (European Union); Plant Phylogenetics & Conservation Group, Xishuangbanna Tropical Botanical Garden (XTBG), China; Agencia Nacional de Promoción Científica y Tecnológica, Ministerio de Ciencia, Tecnología y Innovación Productiva (Argentina); Czech Science Foundation (Czech Republic); Flanders Research Foundation (FWO) 'SB - Strategic Basic Research' panel (Belgium); Agence Nationale de la Recherche, France; National Science Center (Poland); Croatian Science Foundation (Croatia); Fundación "La Caixa", Spain; Scipinion (scientific consultancy, United States of America). BN is currently associate editor of Environmental Science and Pollution Research. BN is a reviewer for international journals (Chemosphere; Ecotoxicology and Environmental Safety; Archives of Environmental Contamination and Toxicology; Journal of Enzyme Inhibition and Medicinal Chemistry; Aquatic Toxicology; Chemistry and Ecology; Water Research; Water, Air, & Soil Pollution; Toxicology; International Journal of Environment and Health; Journal of Toxicology and Environmental Health): BN has also been an editor of international journals (Advances in Environmental Research; Global Journal of Environmental Science and Technology; Reviews of Environmental Contamination and Toxicology; Frontiers of Environmental Science). BN has also been present at public science outreach events, including debates and television documentaries ("Sociedade Civil", RTP2; 'Biosfera', RTP2; and "Planeta Verde", Porto Canal), radio programs ("Mas afinal..."; Rádio TerraNova; "Faz Eco", Rádio Renascença), and has been involved in science outreach activities in public and private schools, and at science fairs.

Eleni Chontzopoulou

AI for a Safer Environment: Cloudpharm's Role in Predicting and Mitigating Ecotoxicity of Pharmaceuticals

As environmental and regulatory pressures increase, the pharmaceutical industry faces a growing need to assess the ecotoxicological impact of both drugs and their metabolites early in the development pipeline. Cloudpharm, a pioneer in AI-powered drug discovery, is meeting this challenge with an innovative platform that predicts ecotoxicity and bioaccumulation potential using advanced machine learning models. In this presentation, we will introduce Cloudpharm and our mission to integrate artificial intelligence with sustainable pharmaceutical development. We will share our perspective on the ecotoxicity problem, particularly as it relates to active pharmaceutical ingredients (APIs) and their transformation products entering the environment. Our platform enables proactive risk identification during drug discovery, helping to flag potentially hazardous compounds and support safer-by-design strategies. This approach not only accelerates regulatory compliance—particularly with frameworks such as REACH—but also reduces dependence on animal testing. We will highlight the potential of our AI-driven models to identify environmental risks early in drug development—paving the way for more sustainable and responsible pharmaceutical innovation.

[Eleni Chontzopoulou](#) is a chemist with a Ph.D. in Computational Chemistry and Drug Design, awarded in 2024 by the University of Athens. She currently works as an R&D Scientist at Cloudpharm, where she is actively involved in projects related to *in silico* drug design and ecotoxicity assessment. Her expertise lies in molecular modeling and drug discovery, contributing to the development of safer and more effective pharmaceutical compounds.

[Eugenia Olivieri](#)

Experimental Zooprohylactic Institute of Sicily, Palermo - Italy (IT)

VBD's One Health perspective: focus on Leishmaniasis

Leishmaniasis is a zoonotic vector born disease that affects mainly humans, dogs and cats, but also many other wild mammals. Approaching leishmaniasis means not only to address a zoonotic disease involving dogs, cats, and humans, but also to confront a complex ecological scenario involving vectors (primarily sandflies), environmental factors, and climate changing; thus, we need a One Health approach to understand, manage and control this disease. Only by integrating human, animal, and environmental health we can identify the multifactorial transmission drivers.

Leishmaniasis presents several critical challenges, which can be grouped into three key areas: environment, vector and parasite.

- **Environment:** The widespread use of insecticides has led to significant ecotoxicological impacts on ecosystems. These substances affect not only sandflies but also pollinators and aquatic species, altering ecological balances and potentially favoring vector proliferation.
- **Vector:** Sandflies distribution is changing, partly driven by human activity. Resistance to insecticides is increasing, while surveillance remains insufficient, especially in peri-urban zones.
- **Parasite:** Reports of drug resistance in *Leishmania* spp are constantly increasing. Treatment failures highlight the urgency of developing new compounds with improved efficacy and safety.

Main current antileishmanial drugs include:

Antimonials, Amphotericin B and Miltefosine, all with limitations, such as: toxicity, cost, resistance, and long treatment regimens. There is an urgent need for new drugs, possibly from natural sources.

National Reference Centre for Leishmaniasis (C.Re.Na.L.) was appointed in 2003 at Istituto Zooprofilattico Sperimentale of Sicily by the Italian Health Ministry. In 2014, the World Organization for Animal Health (WOAH) recognized it as an official Reference Laboratory for leishmaniasis.

Our activities include: Assistance for both serological and parasitological diagnosis; Epidemiological surveillance; Diagnostic optimization for lab testing; Research projects aimed at improving scientific knowledge on parasite biology, host interaction, drug resistance, and new therapeutic approaches.

C.Re.Na.L. competences about COST action specific activity regard testing new anti-Leishmania compounds and new carriers. Our goal is to support new therapeutic strategies, based on evidence and innovation. Currently, genomic approaches are also undergoing at C.Re.Na.L to investigate new molecular targets related to drug resistance in the parasite.

[Pablo Segredo¹](#) and [Janyl Moldaliev²](#)

¹One Health Officer, United Nations Environment Programme (UNEP)

²Policy Officer at the United Nations Environment Programme (UNEP)

Environmental Impact of Pharmaceuticals: Implications for Biodiversity and Antimicrobial Resistance

UNEP provides evidence-based data to inform environmental policy decisions. The organization offers a global outlook on chemicals, waste, and pollution. The presentation will also give an overview of UNEP's activities in this field.

Pharmaceuticals are essential to human and animal health, but their unchecked release into the environment is silently undermining the ecosystems we depend on. Through wastewater, agricultural runoff, and industrial discharge, these biologically active substances contaminate soils, waterways, and air; impacting wildlife, disrupting microbial balance, and accelerating biodiversity loss. One of the most alarming consequences is the rise of antimicrobial resistance (AMR), now recognized as a pollution-driven crisis. As UNEP's *Bracing for Superbugs* report warns, antibiotics, biocides, and heavy metals in the environment exert relentless pressure on microbes, enabling the spread of resistance far beyond clinical settings. These risks are magnified in biodiversity hotspots and regions with limited environmental controls, but the threat is global. Preventing AMR requires upstream action: stronger environmental regulation, green pharmaceutical innovation, better waste stewardship, and cross-sectoral collaboration. Equally vital is the restoration and protection of biodiversity, which underpins natural disease regulation and planetary resilience. Pollution control, AMR prevention, and biodiversity conservation must be seen as one and the same challenge. Only by reconnecting human and ecosystem health through a true One Health approach can we ensure a healthier, safer future for all life on Earth.

[Janyl Moldaliev](#) coordinates policy cooperation between the United Nations Environment Programme (UNEP) and the European Commission, with a focus on the circular economy and zero pollution. Her substantive leadership extends to coordinating global extractives initiatives and contributing to the UN Secretary General's Working Group (WG) on extractives and public sector reforms on resource governance in developing countries. With over fifteen years of experience, she has led multi-disciplinary assessments, managed projects, and provided policy advice in international development and research organizations, focusing on resource governance, sustainability research and a just transition.

[Pablo Sagredo Martín](#) is a One Health Specialist at the United Nations Environment Programme (UNEP) Regional Office for Europe, where he leads efforts to integrate the environmental dimension of the One Health approach into policies across Europe and Central Asia. He coordinates strategically with the European Commission and contributes to the work of the One Health Quadripartite (FAO, UNEP, WHO, and WOA), including the implementation of the One Health Joint Plan of Action (OH JPA) in countries across the region. In addition to his One Health portfolio, Pablo supports the nature agenda in the region, advancing the links between biodiversity, health, and pollution, and promoting environmental action as a cornerstone of pandemic prevention, resilient food systems, and sustainable development.

[Ricardo CARAPETO GARCÍA](#)

Jefe de Área de Seguridad Ambiental / Head of Area Environmental Risk Assessment

Departamento de Medicamentos Veterinarios / Veterinary Medicines Department

Coordinador del Plan Nacional frente a la Resistencia a los Antibióticos en Medioambiente (PRAN)

Miembro del CVMP y del ERAWP / CVMP & ERA Working Party member (EMA)

Parasiticides in the environment: Challenges in the authorisation

All parasites have got a free-living mirror. Sea-louse are crustaceans, ticks are mites, fleas are insects, fasciola are flatworms, ascaris are nematodes... Given the relative nonspecific mode of action of parasiticides, it is obvious that environmental effects can be expected after the treatment of domestic animals with parasiticides. The most immediate environmental effect due to parasiticides is on dung fauna. The dung pat is a rich ecosystem where a prosperous fauna live and thrive. It encompasses several species of beetles, mites, flies, parasitic wasps, fungi... The parasiticides administered to pasture animals are excreted in faeces and consequently affects to the functioning and structure of the dung fauna ecosystem. It has already been proven that the repeated use of ivermectin has a significant effect on the biodiversity of the ecosystem (structure) and on the degradation of dung pats (function).

But besides their inherent toxicity to the environment, parasiticides have certain environmental properties that make them more dangerous. Many of them are persistent in the environment, with a tendency (due to their low solubility and high affinity to organic matter) of building up in river sediments after repeated treatments where the residues can harm sediment-dwelling species.

Given the risky profile of parasiticides, it is reasonable to ask if they can be authorised at all. All the authorised medicines exhibit certain risks (for the user, for the treated animal, for the environment) but the existence of risks does not disqualify a candidate medicine from having a marketing authorisation. In the medicines' framework, the authorisations are granted or not depending on the benefit risk assessment. A medicine with very high risks can be authorised if the benefits are higher. That benefit risk assessment is examined during the authorisation process of each medicine and is impossible to anticipate here a result valid for all the cases.

We must be kept in mind is that, although parasiticides have a risky profile, their use is necessary as parasites are unavoidable threats to farming. In my personal view, we need to, similarly to what is being done for antimicrobials, move to a more prudent and sustainable use of parasiticides that allow us to reduce the emissions to the environment as much as possible. That would also benefit the development of resistances, which is an issue of growing concern in the parasitic diseases specialities.

CV and current role: [Ricardo Carpeto García](#) is a veterinarian who has been working for the last 15 year in the Spanish Medicines Agency. For the last 10 years he has been the Head of the Environmental Risk Assessment area. He is also the Coordinator of the environmental side of the National Action Plan against Antimicrobial Resistance (PRAN). Since 2018 he is coopted member of the Committee of Veterinary Medicinal Products (CVMP) at EMA where he gives support to the Committee in issues related to environmental safety and policies. He has been the Chair of the Environmental Risk Assessment Working Party of the CVMP for the last 6 years.

[David John](#)

Senior Technical Manager of AnimalhealthEurope.

AnimalhealthEurope is the association representing manufacturers of animal medicines, vaccines and other animal health products in Europe.

It is a not-for-profit body representing both corporate members and national animal health associations in Europe. It represents both innovators and generics alike, as well as large, medium-sized and small companies. AnimalhealthEurope's membership covers 90% of the European market for animal health products.

Our mission is to be the voice of the European animal medicines industry.

Our aim is to highlight the importance of healthy pets and farm animals and to demonstrate the reliability and value of our solutions to society. By ensuring a ready availability of animal health products throughout Europe, we can help optimise health management, while contributing to the sustainability of food production and keeping the companion animals that share our homes free from disease.

<https://animalhealtheurope.eu/>

[Maria Paola Costi](#)

Professor in medicinal chemistry at the University of Modena and Reggio Emilia, Italy.

She holds a PhD in medicinal chemistry. Visiting scientist at the University of California San Francisco (UCSF) and is currently a Professor of Medicinal Chemistry in the Department of Life Sciences at Unimore. Prof. Costi leads the Laboratory of Drug Discovery and Biotechnology. Member of the European Science

Foundation College of Experts and has authored 200 papers in international journals and book chapters, along with 21 patents (10 granted/active). She also serves as an editorial board member for several international journals, including *ACS Medicinal Chemistry Letters*.

Her research primarily focuses on discovering anticancer and anti-infective agents that target folate-dependent enzymes and TEAD related proteins. She has coordinated over 37 projects, including those funded by the EU and the Italian Association for Cancer Research (AIRC), and has participated in 7 additional projects at both EU and national levels. She is currently the coordinator (Chair) of the COST Action OneHealthdrugs CA21111 - One Health drugs against parasitic vector borne diseases in Europe and beyond (OneHealthdrugs) that aims to provide safer antiparasitic drugs with lower environmental impact.

Theodora Calogeropoulou

Research Director, Deputy Director of the Institute of Chemical Biology of the National Hellenic Research Foundation and member of the Scientific Council of ICB.

She received her Bachelor's degree in Chemistry from the University of Athens, and her Ph.D. degree from the Department of Chemistry, University of Iowa, USA. She served as a Postdoctoral Research Associate at Scripps Research Institute, San Diego, USA and at the R&D of Viochrom SA and then joined NHRF. She has >30 years experience in medicinal chemistry and her research interests involve the design and synthesis of biologically active molecules against neglected infectious diseases, neurodegenerative diseases and cancer and the design and synthesis of fluorescent bioactive compounds and probes for mechanistic studies, optical imaging and theranostic applications. A parallel research activity involves the development of synthetic methodology using conventional techniques and microwave or ultrasound irradiation. Her research is supported by European and National grants 35 grants (12 of them as coordinator) and by contracts with industries. She has organised national and international meetings, and served as expert evaluator in grant committees (EU, Portugal, France). She has trained >46 junior scientists (Postdocs, PhD, MSs, Diploma students). She is co-inventor of 26 patents and her published work includes 94 peer-reviewed publications [36, h-index (google scholar), citations >3450; 29, h-index (Scopus), citations >2300 and has participated in >150 international scientific meetings. (<http://www.eie.gr/nhrf/institutes/iopc/cvs/cv-calogeropoulou-en.pdf>) (http://www.eie.gr/nhrf/institutes/icb/research_groups/CalogeropoulouTheodora_group_en.html)

Elisa Uliassi¹ and Clara Lima²

OneHealthdrugs Ambassadors. ¹Department of Pharmacy and Biotechnology, University of Bologna Italy, ²Institute for Research and Innovation in Health, University of Porto, Portugal.

A Young Researcher's Perspective on the Early Integration of Ecotoxicity into Drug Discovery and Development for Vector-Borne Parasitic Diseases

As young researchers in medicinal chemistry and veterinary science within COST Action CA21111 – One Health drugs against parasitic vector-borne diseases, we strongly advocate for the integration of ecotoxicity assessment at the early stages of drug development from multiple angles. This is deeply rooted in the One Health approach, which recognizes the interconnectedness of human, animal, and environmental health.

Pharmaceutical residues—especially antiparasitics and antimicrobials used in livestock—are a growing concern, with proven links to antimicrobial resistance, ecosystem disruption, and unintended toxicity in non-target organisms such as aquatic invertebrates and pollinators. Addressing this challenge demands a proactive and interdisciplinary strategy, where environmental risks are considered from the outset of the drug development process.

As early-career scientists, and in our role of OneHealthdrugs Ambassador, we can contribute through practical and impactful actions, including:

- Designing drug candidates with degradability and environmental safety in mind;
- Integrating green chemistry principles in medicinal and veterinary drug development pipelines;
- Applying predictive ecotoxicology models and in silico tools early in screening processes;
- Encourage responsible veterinary drug use and residue monitoring in agricultural settings;
- Promote alternatives to environmentally persistent drugs in animal and human health;
- Integrate ecotoxicity criteria into veterinary pharmacovigilance and licensing processes, as well as in funding proposals and evaluation criteria;

- Collaborating with ecologists, toxicologists, and regulators to co-develop risk assessment and testing frameworks (i.e., optimize dosing practices, reduce environmental discharge, and support environmental risk assessments);
- Promoting educational awareness around pharmaceutical pollution in academic curricula and public discourse.

This stakeholder meeting offers a timely platform to foster dialogue, align priorities, and develop cross-sector solutions. By embedding ecotoxicity awareness into the culture of early-stage research, we can contribute to the development of safer, more sustainable therapeutics—benefiting public health, animal welfare, and the environment alike.

Anabela Cordeiro

University of Porto's Faculty of Pharmacy. Portugal.

She is individual is a Full Professor of Immunology at the University of Porto's Faculty of Pharmacy (FFUP), with a distinguished career focused on host-parasite interactions and neglected tropical diseases like Leishmaniasis, Chagas Disease, African Trypanosomiasis, and Malaria. Their extensive research, documented in over 150 peer-reviewed articles, began with *Trypanosoma cruzi* at the Pasteur Institute (1993) and expanded to *Leishmania sp.*, *Trypanosoma brucei*, and *Plasmodium*. They've successfully supervised 25 PhD students and numerous postdocs. Beyond research, they hold significant academic and leadership roles, including vice-chair of COST Action CA21111 and President of the Scientific Council at FFUP since 2024. They teach Clinical Immunology and contribute to several PhD programs and a new Master's in Microbiology in Health. Their expertise has translated into practical applications, including the launch of a start-up company, VitaControl (2015), and participation in multiple European consortia (e.g., MuLeVaClin, Kindred, NMTrypI) focused on vaccine optimization, drug screening, target validation, and diagnostic kit development for parasitic diseases. Their group is also pioneering research on how *Plasmodium* targets the liver, aiming to identify new vaccine targets.