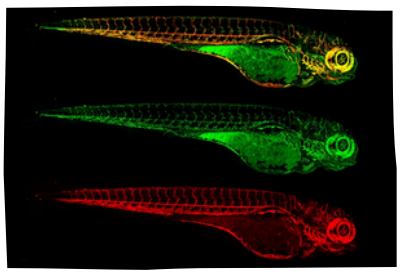
Friday, 22 August 2025

BIOSAFETY & BIOSECURITY NEWSLETTER



Spotlight on Zebrafish Research at UCT

What do tiny tropical fish have to do with understanding the human heart, cancer, and new medicines? A lot more than you might think! Meet the zebrafish (*Danio rerio*), a small but mighty superstar of biomedical research.

Why zebrafish? These little fish share around 70% of their protein-coding genes with humans, making them an incredible stand-in for studying human diseases, development, and potential new therapies. Amazingly, their embryos are transparent, allowing researchers to literally observe biology in action.

Things get even more interesting: scientists can engineer zebrafish to glow with fluorescent proteins in their heart, blood vessels, or immune cells. Under the microscope, these living "neon fish" light up in green, red, or yellow, revealing how cells grow, change, and respond to disease or medicines, in real time.

Prof Gasnat Shaboodien, the Director of the Cardiovascular Genetics Laboratory in the Cape Heart Institute, has established a zebrafish research unit at UCT. They have been breeding Zebrafish since 2017 in the core containment unit. As the first person in South Africa to secure permission for transgenic zebrafish importation, she is awaiting the arrival of six genetically modified zebrafish lines. These include lines designed to express green fluorescent protein (GFP) in the heart, red fluorescent protein in blood vessels, and a yellow fluorescence (from combined green and red) in neutrophils and macrophages.

These fish will be used to establish a functional model for cardiomyopathies, and the fluorescent lines will enable researchers to study all the structural changes in the heart resulting from genetic edits, as well as the occurrence of apoptosis and inflammation. The imported fish will not only be used for studying cardiomyopathies, but can also be used in cancer research, as the fluorescent proteins will enable researchers to investigate tumour growth, metastasis, and responses to specific drugs in vivo following xenografting with human cancer cells.

Working with zebrafish also has its challenges, as Prof Shaboodien can testify. They are very sensitive to changes in their environment, including vibrations and chemicals. It is essential to control the environment in experimental setups to avoid stress responses and ensure consistent and reproducible results.

The husbandry of zebrafish is very labour-intensive and involves regular water changes and health inspections. Prof Shaboodien's zebrafish unit secured funding for a state-of-the-art automated circulatory system, and the unit will soon be expanded to include more tanks to house the new fluorescent arrivals. The new aquatic system will also enable researchers to dedicate more time to their research activities.

Their future plans for the unit include securing funding to acquire an advanced two-photon microscope, which will significantly enhance their imaging capabilities and research potential. Watch this space as this unit embarks on pioneering work, attracting high-impact projects that will enable groundbreaking advancements, ultimately reshaping scientific inquiry right here in Africa!

Contact Sarita Groenewald (sarita.groenewald@uct.ac.za) at ORI if you have any questions about the compliance requirements of your research project.

Compliance requirements when working with GM animals

Institutional requirements	Statutory requirements
Animal Ethics Committee approval covering the welfare of the Zebrafish	Animal Diseases Act Section 20-exempted (Letter received) Veterinary Import permit (issued)
Facility Inspection by the external Veterinarian every three months	GMO Facility Registration certificate GMO Import permit – exempted (Letter received)
Faculty and Institutional Biosafety Committees	SAVC Facility Registration SAVC Authorisation

BIOSAFETY & BIOSECURITY SOPS

The importance of biosafety standard operating procedures in life sciences research facilities

What are biosafety SOPs?
"A set of well-documented and validated stepwise instructions outlining how to perform laboratory practices and procedures in a safe, timely and reliable manner, in line with institutional policies, best practice and applicable national or international regulations" (WHO Biosafety Program Management, 2020). Biosafety and Biosecurity SOPs include a risk assessment and appropriate risk management measures.

Why are SOPs important for biorisk management?
Biosafety SOPs are essential in laboratories that handle biohazardous organisms or materials, as they shape lab personnel behaviour and serve as the cornerstone of safe and responsible scientific practice. These SOPs minimise the risk of accidental exposure, contamination, and environmental release, protecting not only lab personnel but also the broader community and the environment. By clearly outlining proper handling, storage, disposal, and emergency response measures, SOPs ensure consistency and compliance with national and international safety regulations. SOPs can be used as training material for new personnel and students, and institutional approvals (FBC and IBC) and some statutory permit and registration applications require the inclusion or attachment of specific SOPs (e.g., waste management and transport).

What type of SOPs should be developed?

- Procedure-specific SOPs are the most general type of SOP, which describes in detail how to perform a specific laboratory process or experiment. Although all life science procedure-specific SOPs should include a context-specific risk assessment and risk management section, biosafety and/or biosecurity-focused SOPs should also be developed as required. These could include:
  - Agent-specific SOPs are focused on a specific biological agent (hazard) or group of similar agents. The SOP should include a biological risk assessment of the relevant microorganism(s) (use safety data sheets), clinical samples, etc., the laboratory procedures during which agents are used or handled, appropriate risk management measures, storage, decontamination, and emergency procedures (spills, etc.)
  - Transport SOPs describe all packaging, labelling and transport procedures for biohazards, including to and from external facilities, between buildings on campus, and within the building.
  - Waste management SOPs describe all waste categories (solid, liquid, biohazardous, chemical, pharmaceutical) and waste management procedures for the defined research environment.
  - PPE SOPs describe appropriate PPE, donning and doffing, decontamination of PPE after laboratory work, laundering, etc. The SOPs listed above can also include a specific section on the appropriate PPE required for the described procedure.

Characteristics of a well-written SOP

- Written by someone with good knowledge of the task.
- Detailed, clear and concise with step-by-step instructions and easy-to-read format.
- Facilitates accuracy, reproducibility, consistency, quality, safety and training.
- Contains sufficient detail to ensure that someone with a basic understanding but limited experience or knowledge of the procedure can safely and successfully carry out the procedure when unsupervised.
- Includes appropriate administrative control, e.g. reviewed, approved and signed by laboratory management to ensure that the procedures being used are up to date and appropriate
- Updated as required to remain current and relevant (version control).

UCT SOP Templates
As part of the new UCT Integrated Biorisk Management System and the establishment of a safety culture in the labs, standardised administrative controls and laboratory quality management systems should be implemented. Internal document management, approval review and version control systems should be developed in each research environment. The internal facility audits and inspections conducted by the UCT Biosafety, Biosecurity and Environmental Safety Specialists also include the review of biosafety manuals and SOPs.

Templates for SOPs in the proposed standardised format can be found on the Biosafety Resource Website (here) and can be adapted to the specific environment and processes.

Improved Resources Page

We are excited to announce that the Biosafety and Biosecurity Resource Website has been improved, and users can now easily access relevant information via the direct links on the page. Click on the "Biosafety and Biosecurity resources" link on the OHSE Biosafety | Staff page.

The resources are grouped into specific categories, including general biosafety and biosecurity manuals, the South African biosafety and biosecurity-related legislation, biological risk assessment, and other relevant publications.

Please refer to the ***SA Guidelines: Biosafety and biosecurity compliance in research, teaching and testing facilities in SA*** to help you navigate the national regulatory framework.

If you need guidance when completing Section 20 and Veterinary import permits, please see the ***Guideline for Applying for Section 20 and Veterinary Import Permits under the Animal Diseases Act*** under the heading "Animal Health".

New resources and updated guidelines will be uploaded regularly. Please share any relevant biosafety-related literature that will be useful for the UCT research community.

Contacts

Please feel free to contact us in the ORI should you have queries related to biosafety and biosecurity. Your queries can be directed as follows:

- Dr Sarita Groenewald (sarita.groenewald@uct.ac.za) for GMO facility registrations and imports, biosafety audit responses, the South African biosafety and biosecurity regulatory framework and questions about biosafety compliance.

- Mrs Suraya Azam (suraya.azam@uct.ac.za) for queries related to the IBC and Section 20 permits applications submitted prior to August 2025.

- Ms Lisa Williams *****Please note from August 2025 Lisa will be managing all Section 20 application and amendment processes***** (lisa.williams@uct.ac.za) for submission of new Section 20 permits and Section 20 amendment applications.

If you want to enquire about import permits relating to the Department of Health, please contact Dr Blessing Silaigwana (blessing.silaigwana@uct.ac.za).

What you can do

Share this newsletter with colleagues and students in your department.

Visit our revamped webpages and let us know if they are useful, or missing something.

Share resources with us. Please let us know if you have come across a useful resource that improves, simplifies, or provides scientific evidence for your own biosafety and biosecurity management so we may add it to our repository.

Remember to submit Section 20 permit and amendment applications to the ORI for review and final signature (the Department of Agriculture (DOA) won't process an application without our sign-off!).