



**14<sup>th</sup>**  
**International Donor Registry Conference  
& WMDA Meetings**

25 – 29 June, 2024 – Cape Town, South Africa

*All Patients and Donors Matter*

[www.capetownidrc.co.za](http://www.capetownidrc.co.za)



## **Challenges and Emerging Issues in Stem Cell Processing: Quality Perspective**

**Hirasine Sengomona, Anthony Nolan**



# Introduction

Stem cell processing is a critical component in the field of regenerative medicine and biomedical research. The process involves the collection, isolation, expansion, and differentiation of stem cells to produce a sufficient number of viable cells for human application or research.

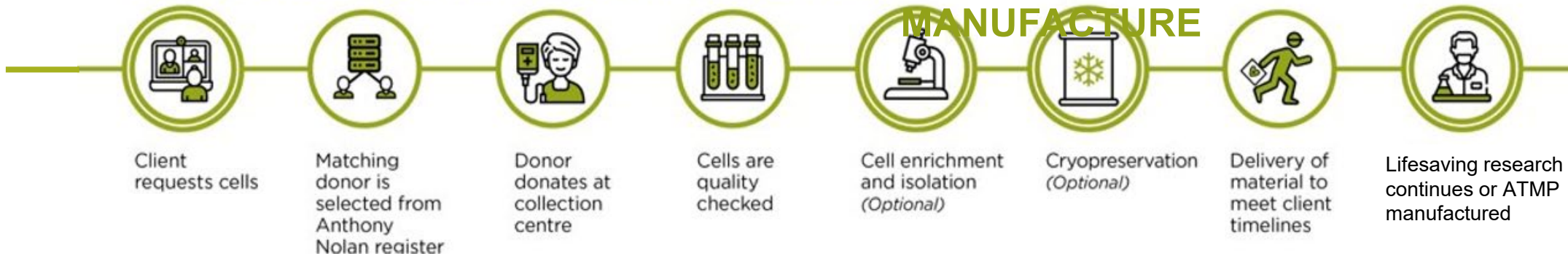
This presentation is going to discuss the challenges and emerging issues in stem cell processing from a quality perspective.

# Current applications, the journey of the cells....

## ...FOR A TRANSPLANT

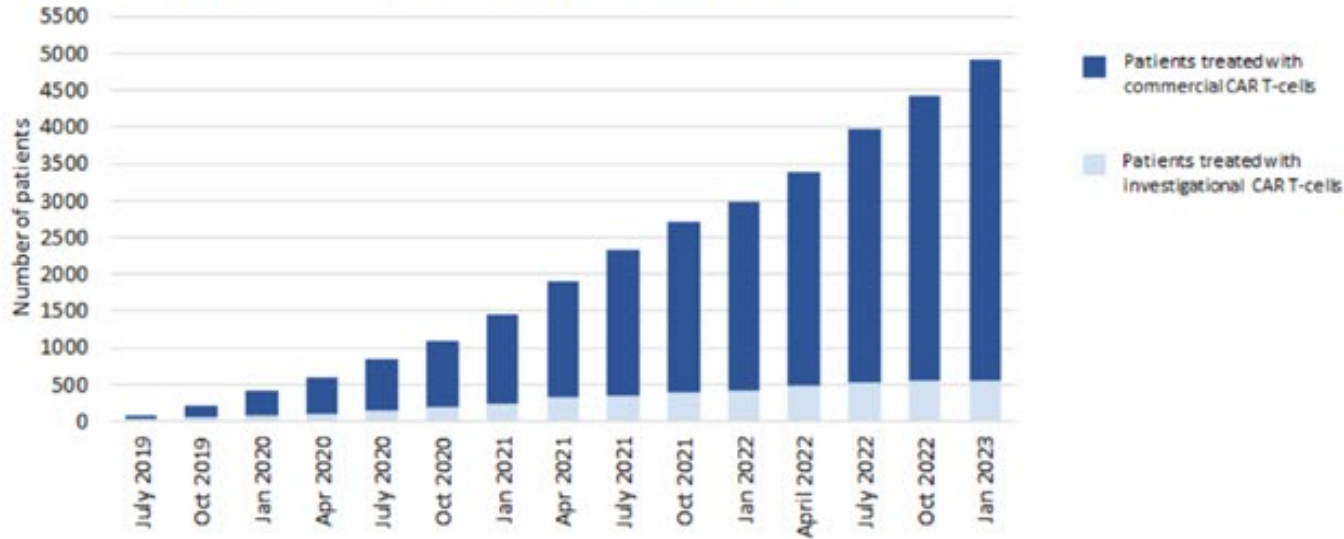


## ...FOR CELL & GENE THERAPY RESEARCH & ATMP MANUFACTURE

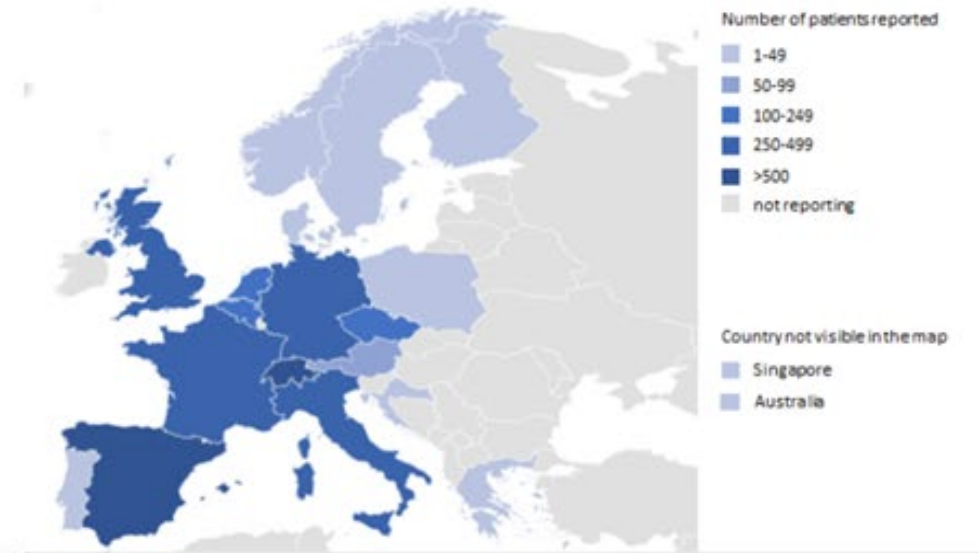


# The changing landscape

Number of CAR T-cell treated patients registered in the EBMT Registry



Countries reporting CAR T-cell treated patients to the EBMT Registry



- The growth in CAR-T patient treatment is rapidly increasing
- However, as more ATMP's are developed numbers are likely to change soon
- If the other advanced therapies in the pipeline prove to be as popular, then ATMP treatment numbers will be enormous.

# Challenges in stem cell processing

- Navigating the regulatory landscape - cross border regulatory compliance
- Quality control - ensuring cell quality and integrity are maintained
- Protocols standardisation - this is essential to ensure reproducibility and reliability.
- Scalability - moving from lab scale to clinical production and ensuring compliance is maintained.

# Emerging issues

- Supply chain management - traceability and integrity of stem cell products.
- New technologies - automation in stem cell processing
- Quality metrics - development of new biomarkers for stem cell quality
- Ethical considerations - ethical concerns in stem cell research and applications.

# A quality approach

- A comprehensive approach is required to overcome challenges and emerging issues in stem cell processing
- This is focused on maintaining high standards throughout the entire process.
- This approach ensures the development of safe, effective, and high quality stem cell therapies

# A quality approach

- Ethical Responsibility - Maintaining high-quality standards to reflect our commitment to ethical responsibility
- Ensuring that we source, process, and apply stem cells in ways that are ethically sound and socially responsible.

# A quality approach

- Regulatory Compliance - Paving the way for broader acceptance and use of stem cell therapies, ensuring cross border compliance is maintained for import and export of cell products
- Patient Safety - Ensuring the highest quality standards are maintained during processing.
- Consistency and reproducibility - Rigorous quality control measures lead to reproducible and consistent results.

# A quality approach

- E.g., for import of cell products into the UK, compliance assessment of the processing facility is carried out against the UK requirements.
- Environmental monitoring (EM) needs to ensure there is continuous viable and non-viable particle monitoring whenever tissue products are exposed to the environment.
- If all UK requirements are not met, a risk assessment is carried out and the units are released under concession.

# A quality approach

- Inspections
  - Regulatory licence – frequent inspections to ensure high standards of practice (e.g., FDA, MHRA)
  - Accreditation - inspections against the most rigorous quality standards in the world to demonstrate quality and standardisation of processes (e.g., FACT)

**ANCTC DAILY  
WORKFLOW  
(PROCESSING)**



Is the cell count clinically relevant for possible Tx

**Yes**  
Are there enough stem cells pre-process?

Units processed



**Yes**



Perform second cell count and calculate cell yield



Are there enough stem cells?

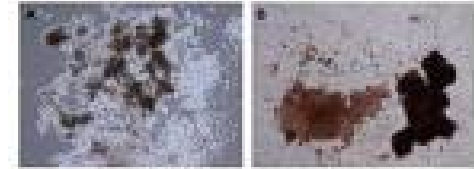
**Yes**



Is the unit contaminated with bacteria or fungi?



**Yes**



Can the stem cells produce colonies?

# Processing Criteria – ANCTC

- Unit age < 30 hours old from CBU collection to processing
- CBUs acceptance criteria based on cell content of initial sample:
  - Total cell content ( $>1400 \times 10^6$ ) performed on a heamatology analyser
  - Stem cell content ( $> 3.2 \times 10^6$ )
  - Units that meet these criteria would be sent for processing and storage.
- Acceptance criteria for HPC (A) processing decision defined by the Transplant Centre or client

# Processing at Anthony Nolan

- The ANCTC uses the Sepax 2 system for cord processing as it is one of the most versatile
  - Gives good MNC and TNC yield
  - Fully traceable process including tracking of reagents and kits used
- HPC(A) are processed manually within grade A flow hood
- Cells are then frozen by CRF before being stored in cryotanks

# Testing - Quality and Safety

- **SAFETY**

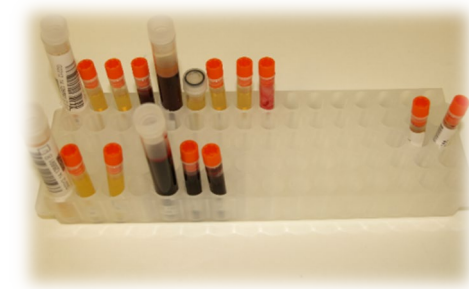
- Sterility / BACTEC®
- IDM / Virology
- Haemoglobinopathies (CBUs)

- **CELL CONTENT**

- TNC
- CD34

- **POTENCY**

- Viability – Flow Cytometry
- Colony Forming Unit (CFU) assay for CBBs



# Cryogenic Storage



- Use of Cryocart after CRF freezing (Planer)
- Storage below -150C (as a minimum) in vapor phase and overwrap
- Double temperature control system and remote alarm
- 3 tank designations: research, quarantine clinical, long term clinical storage

# Conclusions

- Navigating regulatory landscape and cross border compliance is challenging
- There is a need to address ethical concerns around stem cell research and applications
- New technologies are emerging, requiring the need for quality standards to be maintained and consideration of new regulations to be implemented.

# Conclusions

- It is critical to focus on quality, to build a solid foundation for the future of stem cell therapy, enhancing its potential to revolutionise healthcare, save and improve more lives.
- As we move forward, we need to prioritise quality in every step of our journey, ensuring that the promise of stem cell therapy is realised to its fullest potential.

# Thank you!