Investor Presentation
September 2023
Human & Animal Programs

MEMPHASYS
REPRODUCTIVE BIOTECHNOLOGY

Better technology more life

Our mission is to develop and commercialise superior reproduction and fertility solutions for humans and animals

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This presentation provides indicative timelines for various product development and commercialisation activities. These timelines are based on best current estimates, which are subject to change.

Why Memphasys?

1. Pipeline of unique human and animal products co-developed with Memphasys' **Professor John Aitken,** Scientific Director and world-renowned leader in fertility

2. Product R&D strategy exclusively **addressing unmet demand in global reproductive technology** markets

3. **Clear pathways to market** to market for each product

4. **Executive leadership with requisite expertise** to deliver strategy and grow long-term shareholder value

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Distinguished Emeritus Professor John Aitken

- A global leader in reproductive biology, heading up his research team at University of Newcastle.
- Leads the development of MEM's pipeline products to proof-of-concept stage.
- *Ranked #1 in the world in the cell biology of spermatozoa and germ cells.
- Has published over 650 research articles and his work has been cited ~55,000 times**
- Author of the the award-winning ***The Infertility Trap*** which discusses factors of the accelerating global decline in human fertility.

*Source: Expertscape.com
**h-index of 120, highest citation index in his field and in the top 5% for all of Biology and Biochemistry

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Pipeline

Product Development Program	Market	Proof of Concept	Prototype Development	KOL Testing	Clinical/ Field Trials	Sales
Felix™ Device (Sperm separation device for human IVF)	Early access	✓	✓	✓	✓	✓
	Highly regulated	✓	✓	✓	✓	
RoXsta* (Rapid *in vitro* antioxidant assessment)	Early access	✓	✓			
	Highly regulated	✓	✓			
AI-Port (Ambient temperature semen transport device for animal Artificial Insemination)	Early access (animal use has low regulatory barriers)	✓	✓	n/a	✓	
Media Development	Early access for animal. Highly regulated for human	✓	✓			

* Formerly named ROSA; trademark application pending

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Set for growth

New Talent

- Director Business Development
- Director Operations
- Appointments underpin critical commercialisation of product and markets

Opening Markets

- Exclusive Felix™ System distribution agreement with Vitrolife in Japan
- Five-year deal
- Endorses value of Felix™ System and bolsters Japanese market presence and sales

New Patents

- New patents granted in Australia to support robust IP regime already in place in:
  - China
  - Japan
  - United States

Pipeline Building

- Prof John Aitken (Scientific Director) & University of Newcastle team advancing unique, high value product pipeline

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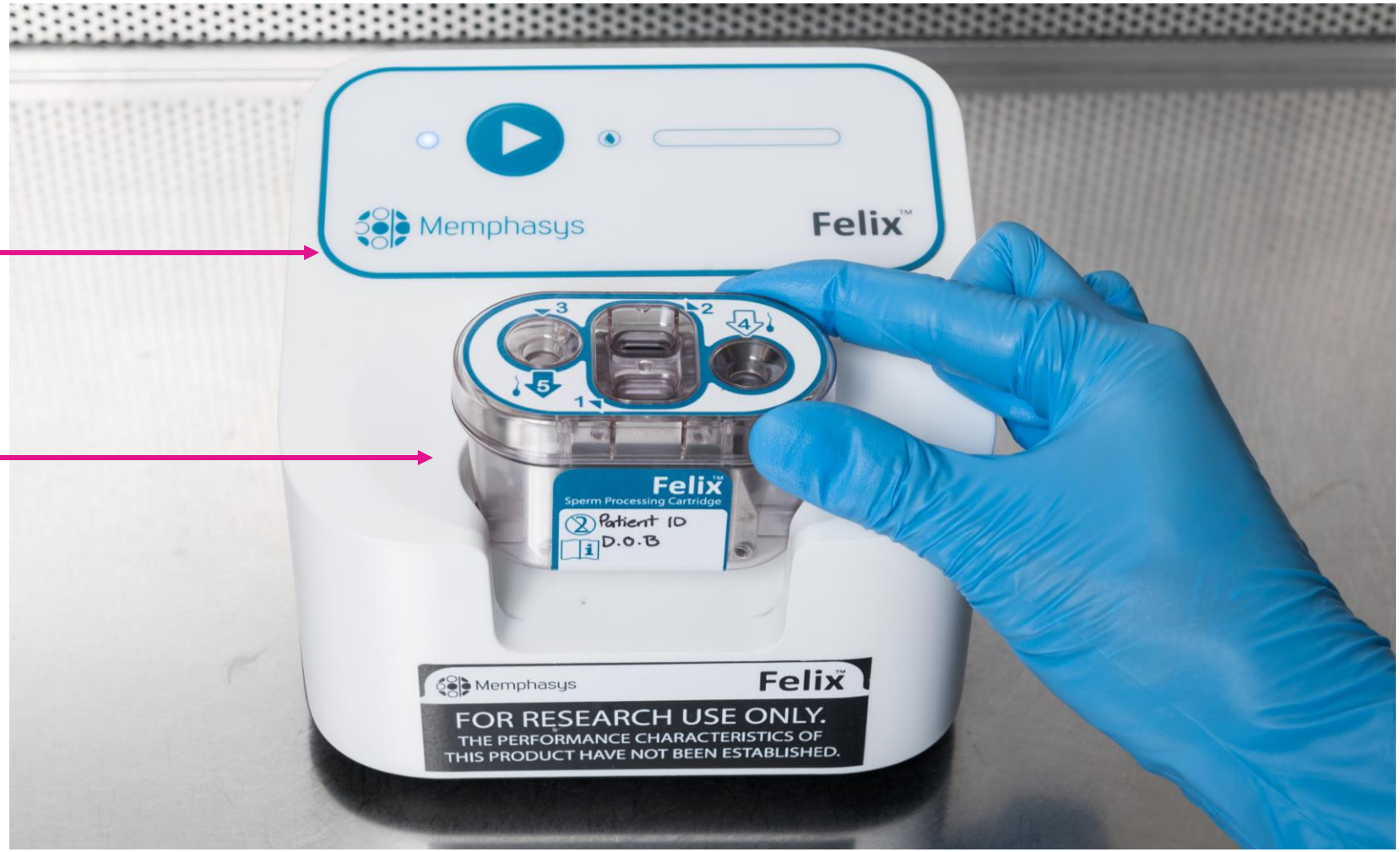
Felix™ System: Better technology for IVF sperm preparation

Console

Ongoing, repeat revenue from single-use cartridge*



* A new cartridge is used for each semen sample

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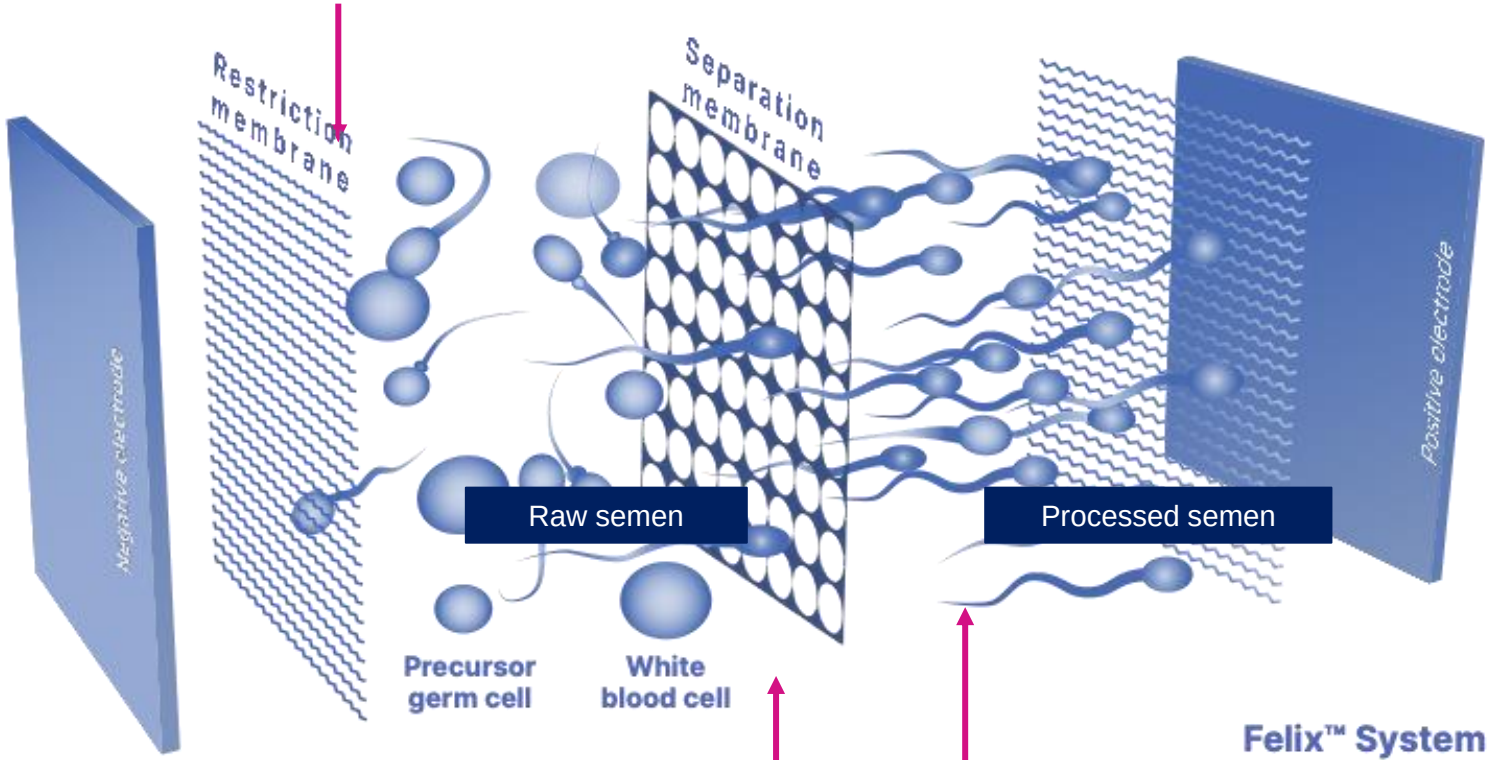
Felix™ System: Sperm separation principles:
High sperm negative charge and size exclusion membranes

Allows ion transfer but blocks sperm passage



Separates sperm from other cell types

Mature, negatively charged sperm harvested after 6 mins

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Felix™ System: Better technology

Electrophoretic system selects sperm with both low DNA damage & oxidative stress

Can process wide quality range of semen samples

Easy 6-minute process

Single-use, disposable cartridge

One-step and automated

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Felix™ System: Proven efficacy

- Peer review publications
  - Live healthy births - and from highly damaged sperm
  - Improved sperm quality
  - Rapid and easy to use

ANDROLOGY

ORIGINAL ARTICLE | Open Access

Spermatozoa isolation with Felix™ outperforms conventional density gradient centrifugation preparation in selecting cells with low DNA damage

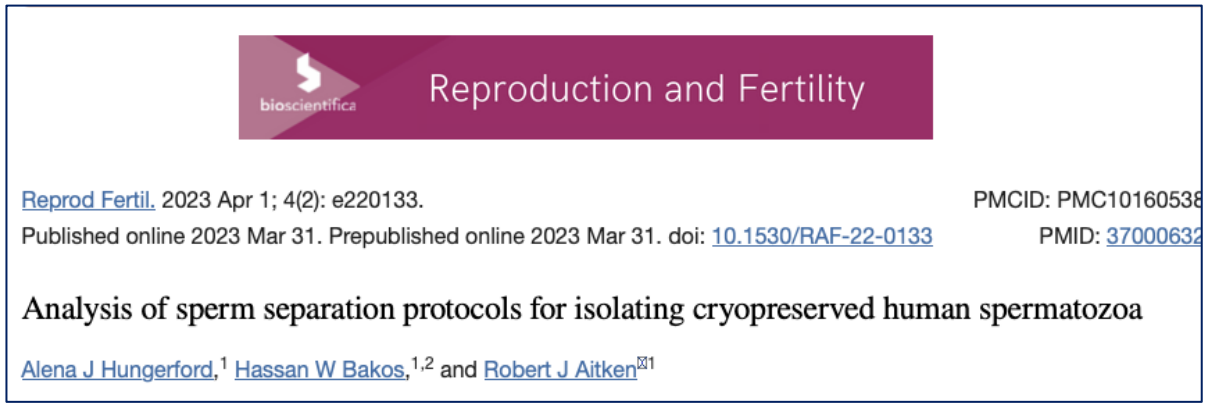
Pauline Villeneuve, Fabrice Saez, Elisa Hug, Areski Chorfa, Rachel Guiton, Benoit Schubert, André Force, Joël R. Drevet

First published: 11 January 2023 | https://doi.org/10.1111/andr.13384 | Citations: 1

FIRST RECORDED NORMAL LIVE BIRTH AFTER ICSI WITH ELECTROPHORETICALLY ISOLATED SPERMATOZOA USING THE FELIX™ SYSTEM

Aspire Adelaide 2023

Welcome Back to Our Future



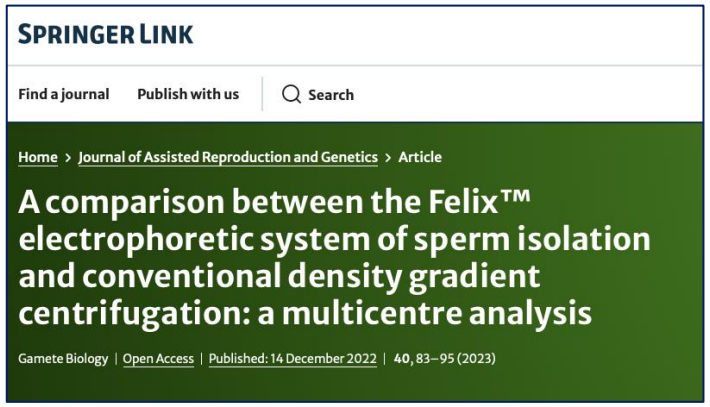
bioscientifica Reproduction and Fertility

Reprod Fertil. 2023 Apr 1; 4(2): e220133. PMCID: PMC10160538

Published online 2023 Mar 31. Prepublished online 2023 Mar 31. doi: 10.1530/RAF-22-0133 PMID: 37000632

Analysis of sperm separation protocols for isolating cryopreserved human spermatozoa

Alena J Hungerford,[1] Hassan W Bakos,[1,2] and Robert J Aitken[1]



SPRINGER LINK

Find a journal Publish with us Search

Home > Journal of Assisted Reproduction and Genetics > Article

A comparison between the Felix™ electrophoretic system of sperm isolation and conventional density gradient centrifugation: a multicentre analysis

Gamete Biology | Open Access | Published: 14 December 2022 | 40, 83–95 (2023)

Felix™ System: First recorded births in India*

- **All couples had poor prognosis for success:**
  - All suffering from failed repeat cycles
  - Highly damaged sperm**
  - Some had recurrent pregnancy loss

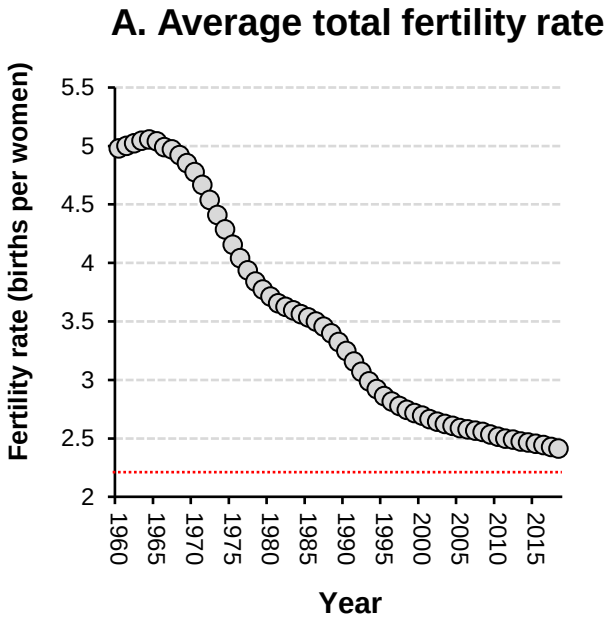
- **Clinical results to date:*****
  - Embryo transfers: 40
  - Clinical pregnancies :14
  - 11 healthy births = 28% live birth rate,
  - High success rate from poor patient cohort
  - The first birth - 80% sperm DNA fragmentation.
    - Usual process with high DNA fragmentation is to surgically retrieve sperm from a testicular biopsy
  - Quick, reliable & easy use reported

*Presentation given at the Aspire Conference in Adelaide, 9 October 2023, by Dr Ramya Jayaram from Womens Centre, Coimbatore, India, on clinical results using the Felix™ system to prepare sperm for ICSI procedures
** Average DNA fragmentation: 34%, maximum 80% (20% is considered high)
***Some embryos are still frozen and are yet to be implanted

New Japanese partnership with Vitrolife, Japan
Exclusive distribution of the **Felix™ System**

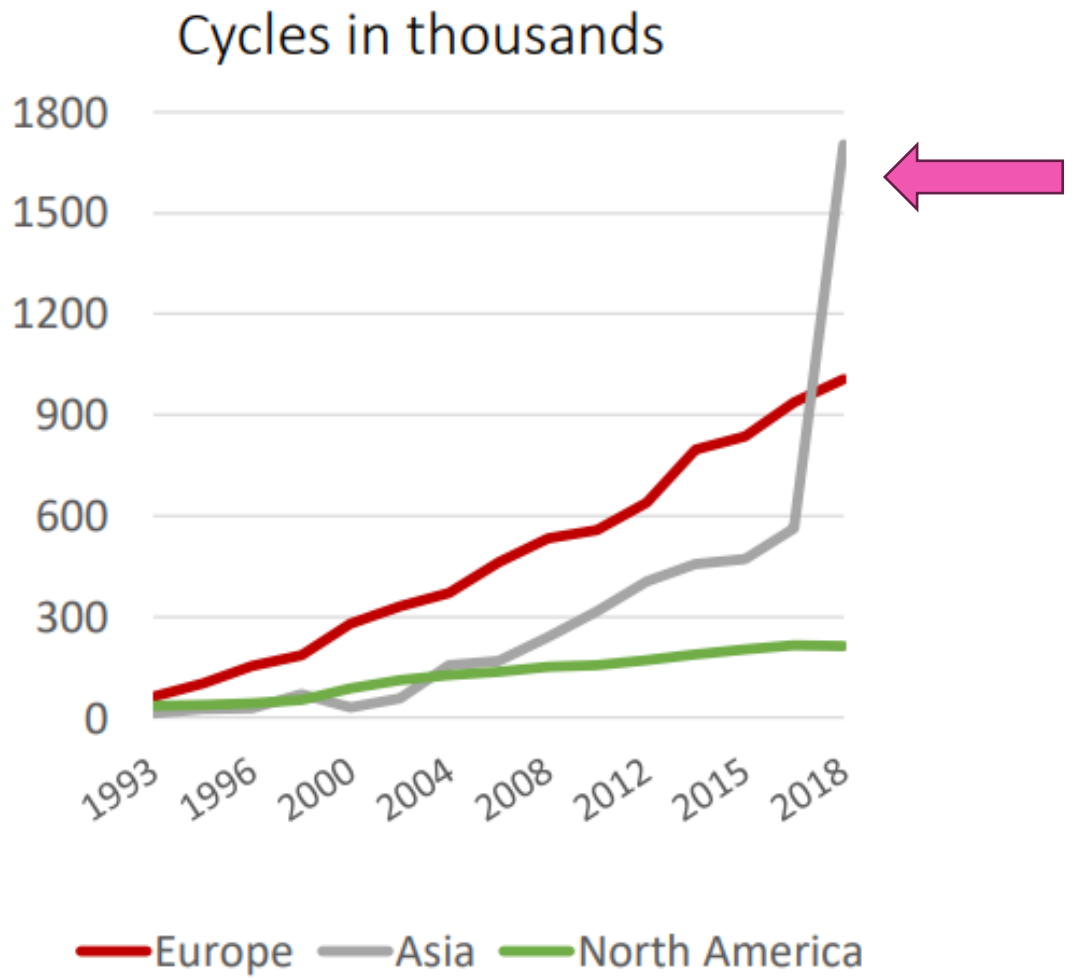
Global fertility decreasing – males account for ~50%

- 1 in 6 couples experience fertility issues
- **Sperm dysfunction is the single most common cause of infertility**
  - Sperm counts decreasing
  - Sperm DNA damage and oxidative stress are major contributors
  - Solutions to identify or reduce the effect of oxidative stress and DNA damage are desperately needed
  - Little progress in sperm processing for ART in over 40 years



http//www.data.worldbank.org

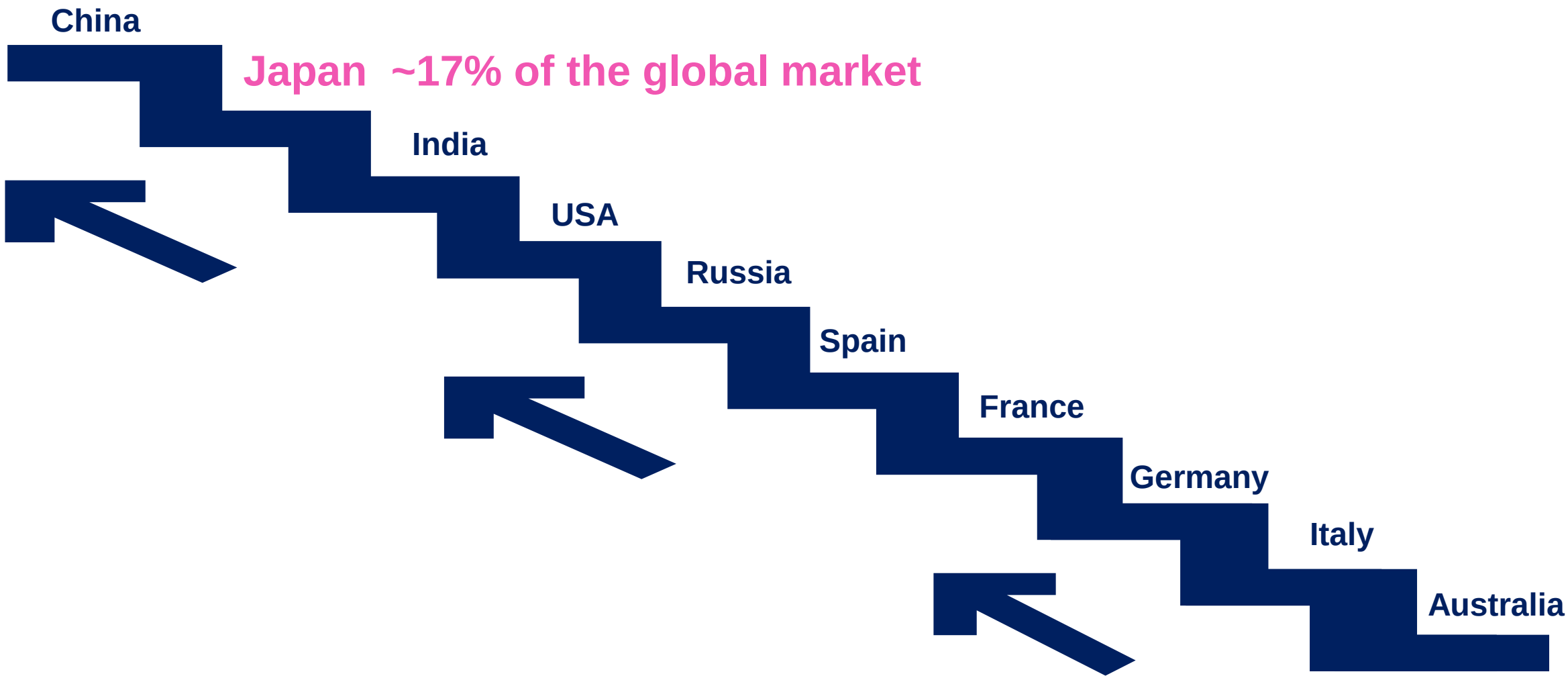
Increased demand for assisted human reproduction



Three regions – Asia, Europe and N America - constitute ~90% of the global market

https://www.icmartivf.org/wp-content/uploads/ICMART-ESHRE-WR2018-Preliminary-Report.pdf

Global ART*: Top 10 market contributors (ascending order)



*Assisted Reproduction Technology

https//www.cnbctv18.com

Global market opportunity: ~A$2 billion

https://www.icmartivf.org/wp-content/uploads/ICMART-ESHRE-WR2018-Preliminary-Report.pdf

Early access market opportunity: ~A$31 million

https://www.icmartivf.org/wp-content/uploads/ICMART-ESHRE-WR2018-Preliminary-Report.pdf

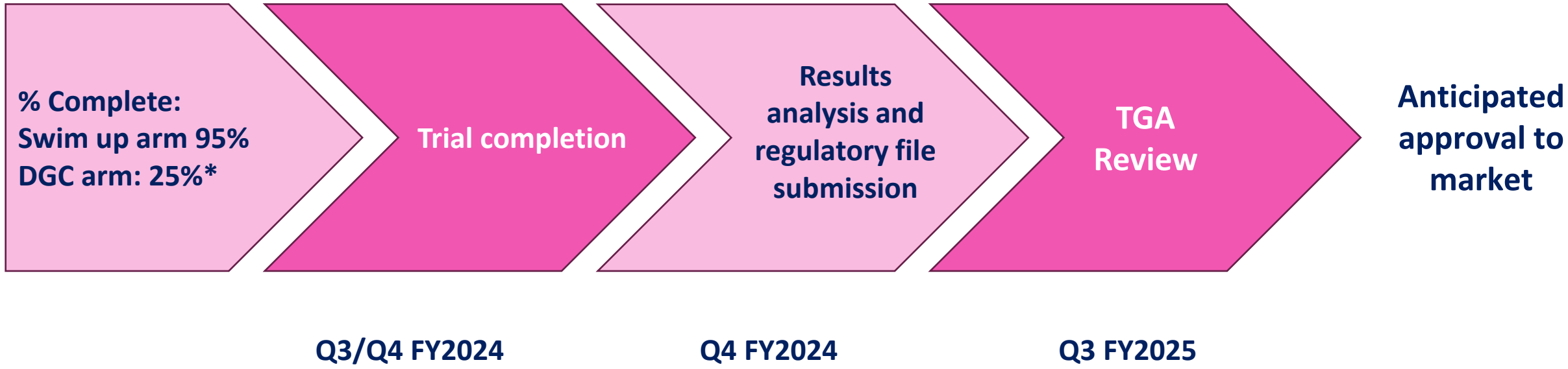
Sales pathway in early access markets

	Regulatory Hurdles	Local distributor appointed	Pre-sales	Sales
Japan	✓	✓	✓	✓
NZ	✓	✓	✓	
Canada	✓	✓		
Other (Developing countries e.g. Bangladesh, Sri Lanka)	Seeking specialist regulatory advice			

Sales pathway in highly regulated markets: 2024-25

	Regulator	Pre-submission	Clinical trials	Comments
Australia	TGA	✓	✓	Anticipated completion 3-4Q FY24
India	CDSCO	✓	n/a Australian Clinical trial anticipated to be sufficient	In-country (TGA) approval is standard pathway Investigating earlier access options
EU	MDR		n/a Australian Clinical trial anticipated to be sufficient	Application pending post Australian trial completion
China	NMPA	✓	TBD	Responding to NMPA's technical & clinical queries
USA	FDA	✓	In-country clinical trial required	Will be a *de novo* FDA classification

Monash IVF Trial: Progress and path to TGA registration



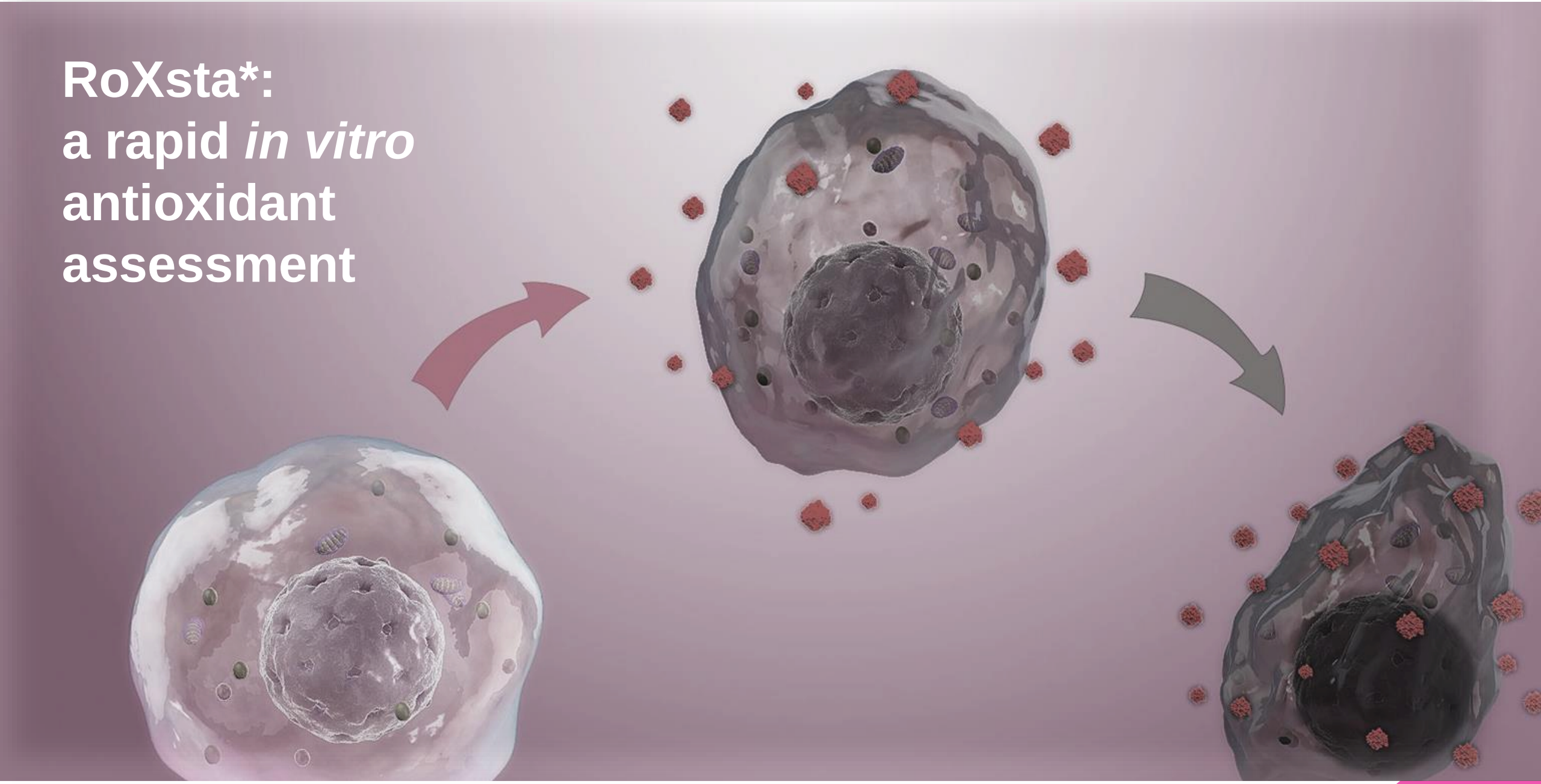
* New Monash IVF site in Perth recently added to bolster DGC recruitment

Felix™ System: Advantages over traditional methods

Conventional DGC (Density Gradient Centrifugation) and/or swim-up processes*		Felix™ System
Process: 30-60+ minutes	→	Rapid - six minutes
Multi-step & labour intensive	→	Single vessel & automated
Specialised clinical operators	→	Easy to train and operate
Complex equipment	→	Console & cartridge
Operator variability	→	Consistent & operator independent
Limited applications	→	Wider applications
Potential for sample mix-up	→	Minimised risk
Increased DNA damage (in DGC)	→	Reduced DNA damage

* Includes Zymot & LensHook

RoXsta*: a rapid *in vitro* antioxidant assessment



* Formerly titled ‘ROSA’

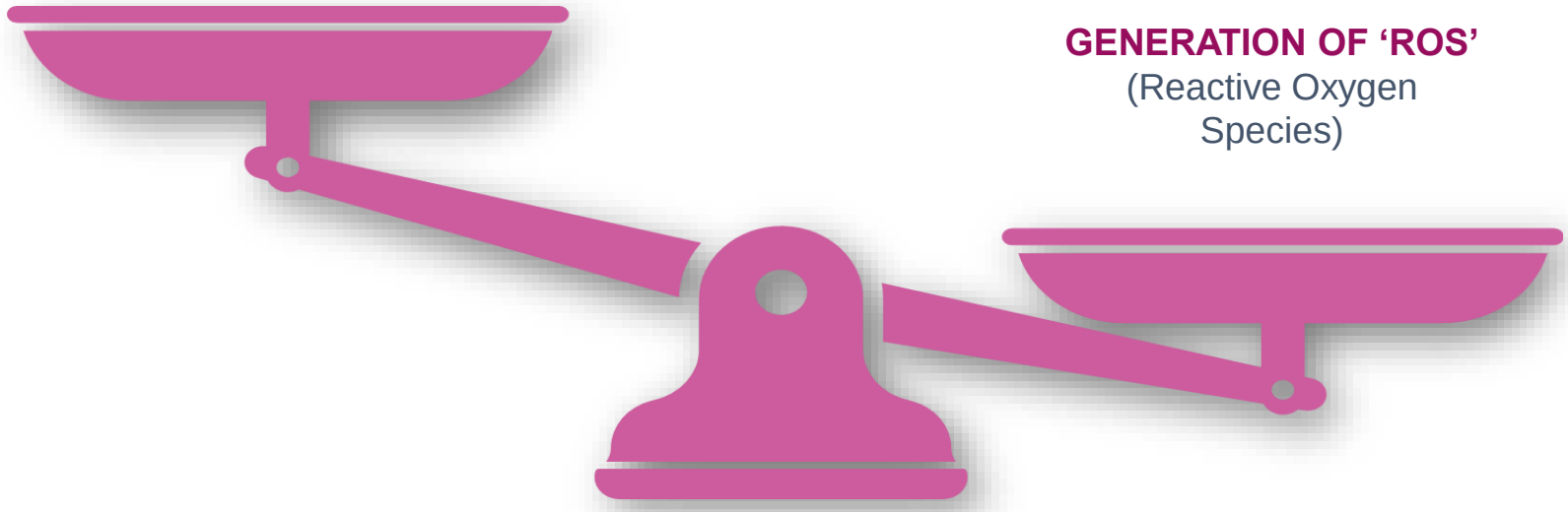
Oxidative Stress: A serious chemical imbalance

ANTIOXIDANTS
Cellular reactions
Healthy diet
Specific oral formulations

CELLULAR METABOLISM
Free radical generation

+

EXTERNAL ADVERSE FACTORS
Ageing/Stress
Environmental Toxins
Unhealthy Lifestyle



GENERATION OF 'ROS'
(Reactive Oxygen Species)

Reductive Stress: An equally serious chemical imbalance

- Chronic antioxidant overdosing
- Elevated levels of biochemical reductants
- Reduced testosterone production
- Cellular energy dysregulation

The adverse effect of oxidative/reductive stress imbalance

Oxidative stress

- Aging
- Impaired sperm production and maturation
- Increased sperm DNA damage
- Potential transgenerational effect
- Mutation in offspring
- Miscarriage
- Pre-eclampsia

- Chronic inflammatory disease
- Cancer
- Neurodegenerative disease
- Neuropsychiatric disorder
- Diabetes
- Cardiovascular disorders
- Chronic fatigue
- Asthma
- Erectile dysfunction

Reductive stress

- Heart failure
- Neurogenesis inhibition
- Decreased cellular metabolism
- Muscular dystrophy
- Pulmonary hypertension
- Rheumatoid arthritis Alzheimer's disease
- Diminished life expectancy

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RoXsta: Fills unmet diagnostic need

Current practice

Testing for oxidative stress is rare:

- Complex equipment
- Time-consuming in lab
- Oxidative stress often undiagnosed
- Late or no clinical intervention

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Testing is easy with Memphasys:

- Simple point of care diagnostic device
- Six-minute process
- Sensitive & accurate
- Wide sample fluid choice:
  - Semen, blood, urine, saliva, follicular fluid and spent embryo culture medium
  - Wide sample choice: more accurate disease profiling
- Competitively priced
- Timely clinical intervention

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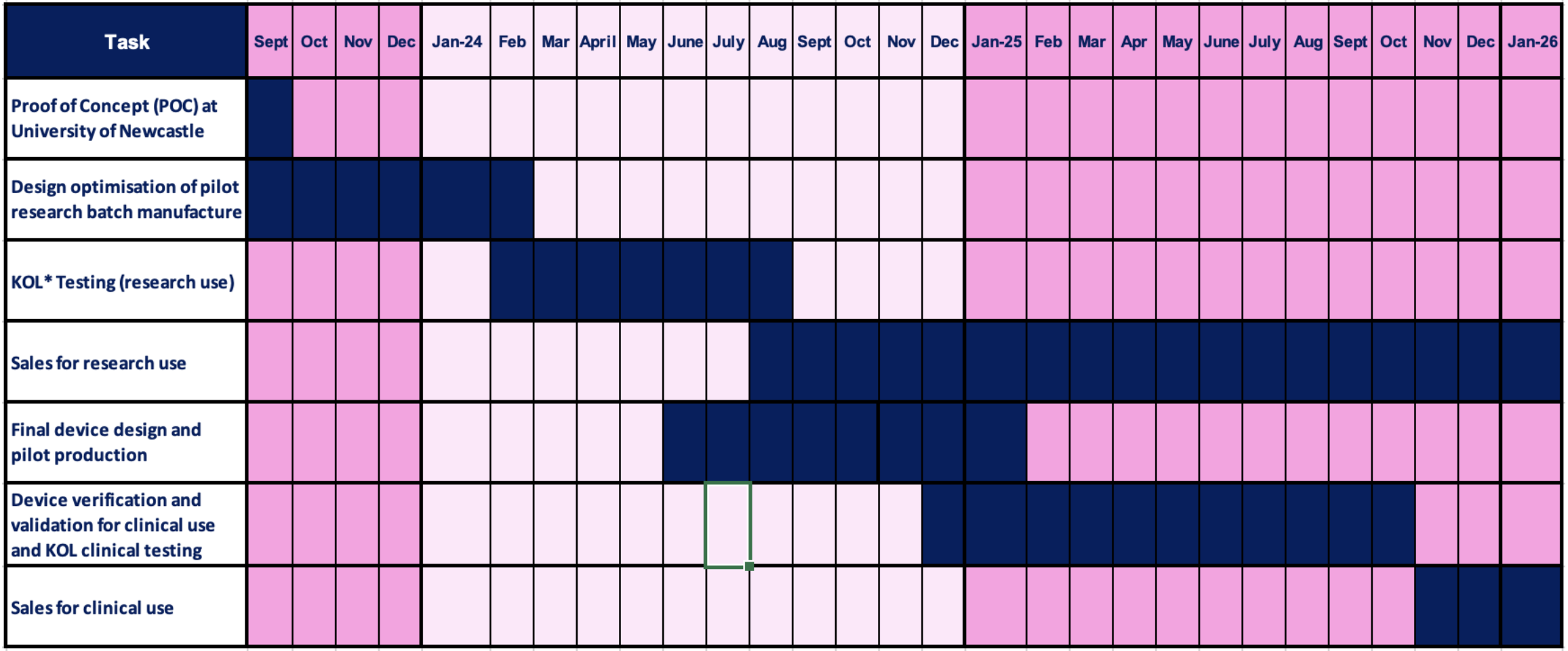
RoXsta: Stage of development

- Proof of concept established by Prof. John Aitken's research team at University of Newcastle
- RoXsta comprises 4 separate assays* all using the same fundamental device structure to measure different aspects of antioxidant activity
- The development of 4 separate point-of-care assays, each only taking 5 minutes, will be a unique product offering
- Next step in development: External design house developing prototype and manufacturing pilot batch initially for research use

*1. Lipid peroxide scavenging
2. Hydrogen peroxide scavenging
3. Free radicle scavenging
4. Inhibition of free radicle formation

RoXsta: Indicative Path to Market



Potential uses of RoXsta

User group	Application
Fertility researchers	▪ Researching underlying etiology of infertility & gestational issues
IVF clinics	▪ Screening for infertility issues in male and female patients
Obstetricians	▪ Diagnosing and monitoring the progress of pregnancy; detecting foetal distress
Food technology industry	▪ Screening for food antioxidant activity, e.g. to use in product marketing ▪ Addition of new, healthy antioxidants to extend food shelf life/improve health benefits
MEM internal use	▪ Screening for most powerful antioxidants to develop improved media for human & animal reproduction
Other clinician groups	▪ Diagnosing and monitoring various health conditions beyond fertility issues e.g. cardiovascular, neurological, endocrine etc.
Point of care consumer test	▪ Assessing antioxidant status at home
Personalised medicine	▪ Ability to titrate individualised levels of antioxidants and other drugs to administer

RoXsta: Addressable market estimated at >$10 billion

Application	Size
Fertility researchers	$3m
IVF clinics	$3b
Obstetricians, urologists, endocrinologists	$4b
Food technology industry	$3b
Other applications e.g. clinicians specialising in other disease states, consumer use	TBD

Conservative market size assumptions, based on industry interview estimates:

- Competitive pricing for each potential user group
- Limited use (only twice per week)
- Conservative take up (5% of clinicians, 15% of IVF clinics, 50 % of fertility researchers)

*Google search and industry interviews

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RoXsta: Pathway to market

	Application	Requirements prior to selling			
		Industry KOL testing	Verification & validation studies	Small clinical trial	Regulatory approval
Early sales potential	Fertility research market	✓			
	Food industry monitoring	✓			
Higher regulatory requirements	Diagnostic fertility market (male & female)	✓	✓	✓	✓
	Pregnancy clinical monitoring	✓	✓	✓	✓
	Monitoring for other health conditions e.g. diabetes	✓	✓	✓	✓
	At home monitoring	✓	✓	✓	✓

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AI-Port: Aim is to increase cattle pregnancy rates with AI

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Artificial insemination (AI) is the most efficient method to improve herd genetics

- Initial target: beef cattle - growing need to improve genetics in high end cattle breeds e.g. wagyu, Black Angus
- Later applications: high end dairy, horse* (non-thoroughbred)

Heritable production traits	Degree of heritability		
	Low	Medium	High
“Mothering” ability	✓		
Fertility	✓		
Birth weight		✓	
Milk production		✓	
Growth rate		✓	
Feed conversion ratio			✓
Marbling			✓
Mature weight			✓

*AI use is illegal in thoroughbreds

AI technology is antiquated and needs improvement

Current AI process

Step 1

Semen collection

Step 2

Sperm count, motility and morphology assessed

Step 3

Semen cryopreserved at -196 ^{o}C.

Cryopreservation causes irreparable damage to sperm cells resulting in reduced pregnancy rates

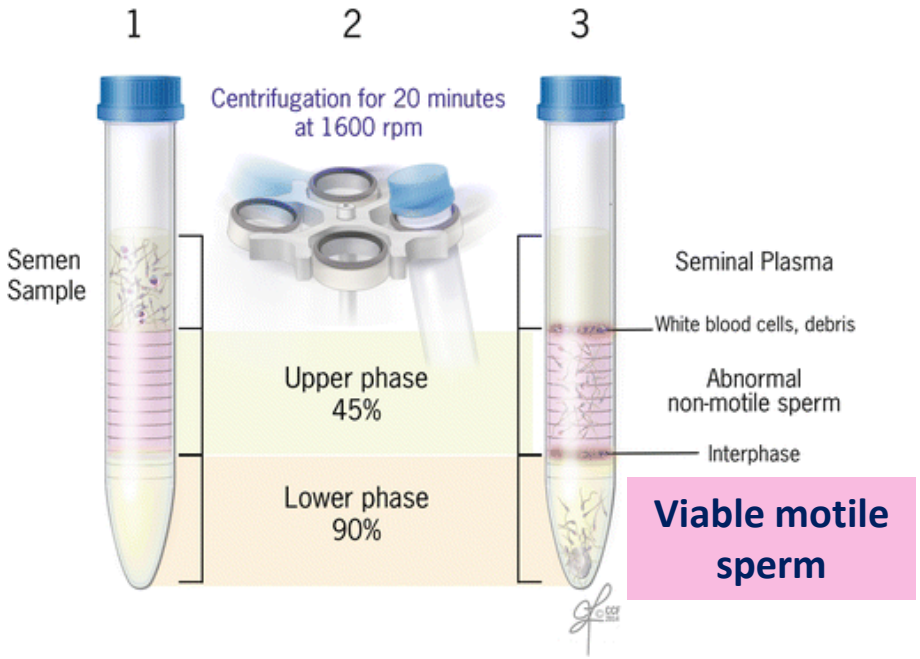
Step 4

Semen straws are kept in liquid nitrogen until they are required for AI

MEM's new protocol to prepare sperm for AI without freezing

Step 1 → **Step 2** → **Step 3**

Semen collection



Toxic seminal plasma is removed

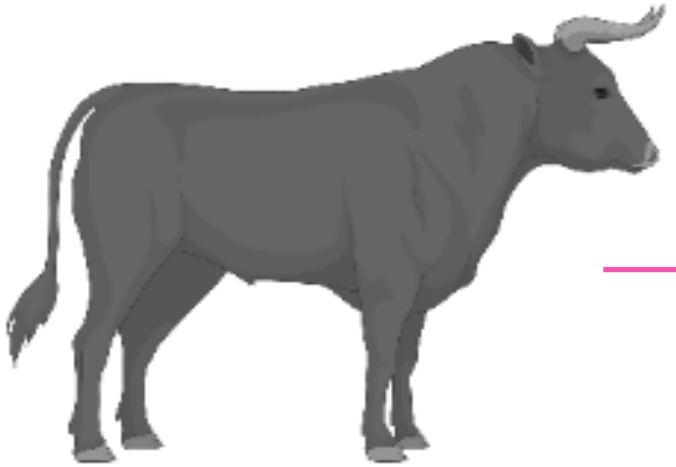
Simple centrifugation to remove the seminal plasma

No freezing

Sperm extended in MEM's proprietary medium for up to 4 days

Spring 2023 pregnancy comparison field trial

Step 1 | **Step 2** | **Step 3**

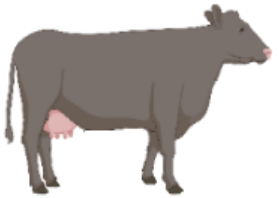


3-4 bulls from stud in NSW Hunter region

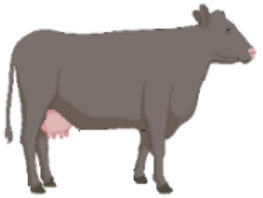
Raw ejaculate extracted

Frozen semen

Isolated (centrifugation) sperm cells in MEM's AI-Port medium



150 cows
Current industry method



150 cows
New method
Higher pregnancy expected*

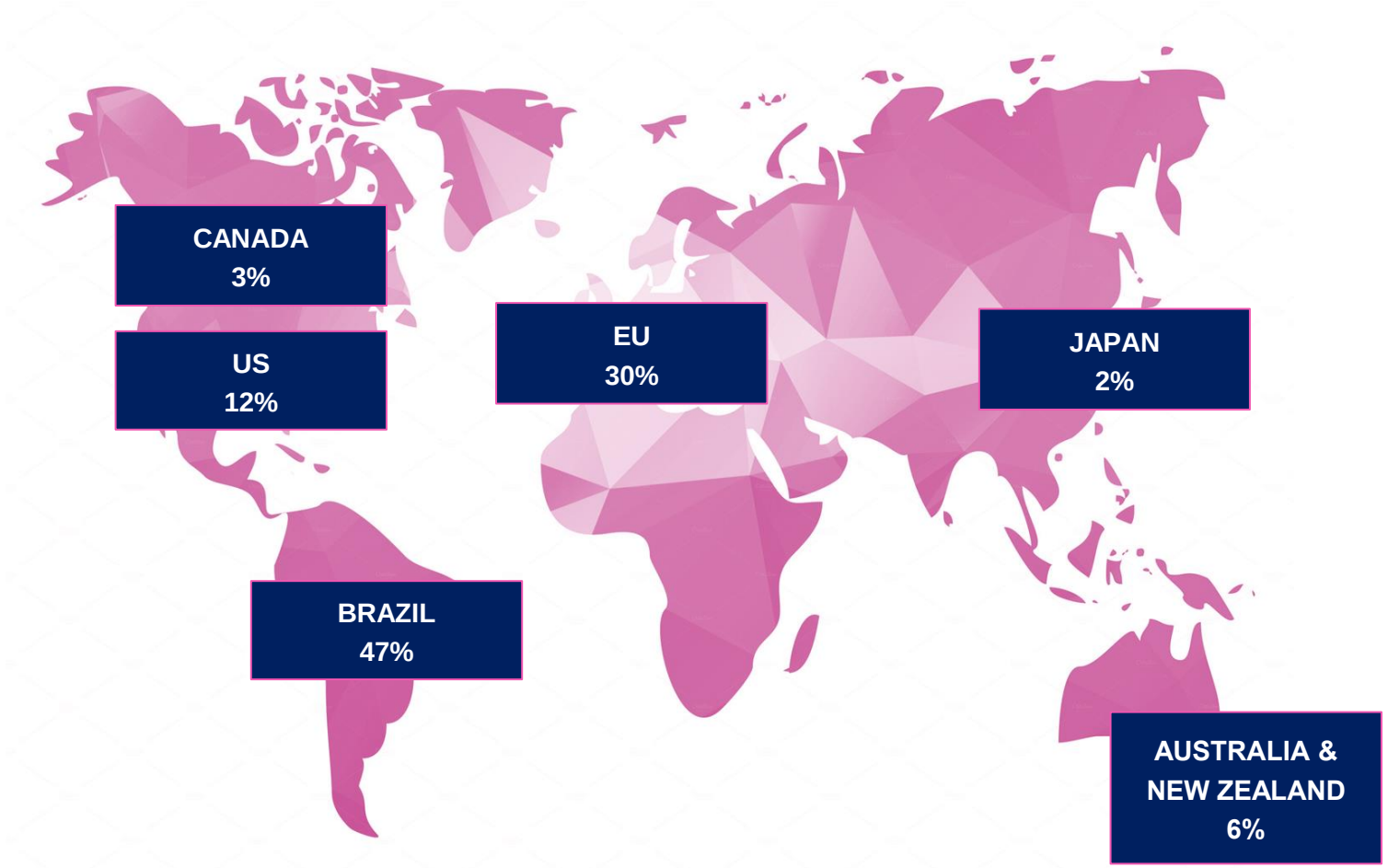
Even a small improvement, on the industry average rate of 40% pregnancy rate, would provide a substantial economic benefit. Source: Industry interviews

Indicative AI-Port Pathway to Market

Next steps after field trial, assuming positive result:

- MEM will manufacture the media in-house and then seek to sell AI-Port in the next breeding season to Australian producers
- MEM will also prepare access for selling in overseas markets

AI-Port – Potential accessible market ~ A$2.4 billion



APPROXIMATE SIZE OF TOP SIX AI BEEF MARKET BY COUNTRY/ REGION [1, 2]

1 Extracted multiple sources: Grandview Research–Veterinary AI Market Size, share and trends, analysis report by animal type–2017–2030-https://www.grandviewresearch.com/industry-analysis/veterinary-artificial-insemination-market;United States Department of Agriculture–Foreign Agricultural Service 2021 (Report No: BR2021-0010);"World Statistics for Artificial Insemination in Cattle; Statista–"Capturing the Value of Artificial Insemination in Commercial Herds";"Artificial Insemination–Current & Future Trends"

2 As percentage of global total doses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more life
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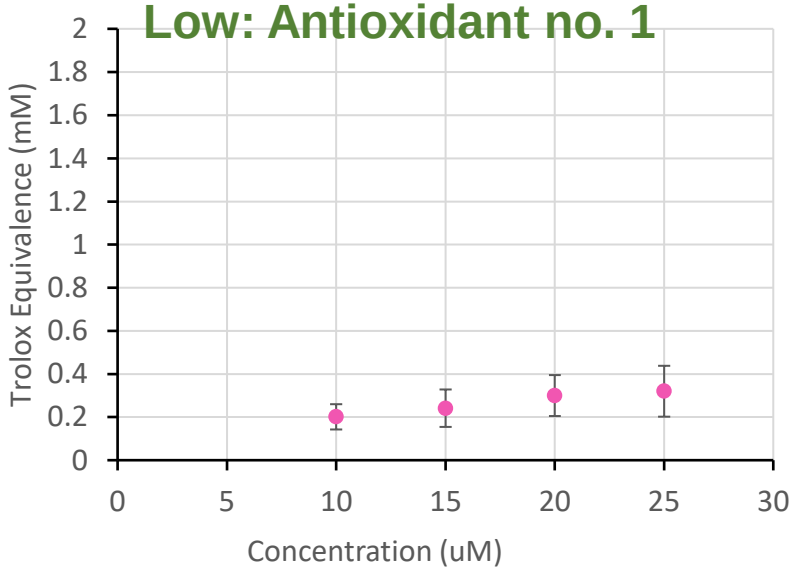
Appendices

RoXsta is a quick (5 minute), novel point-of-care diagnostic

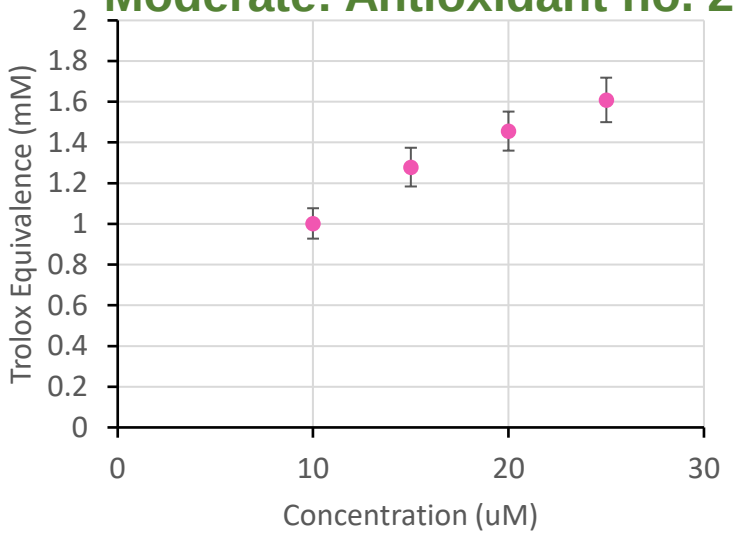
- **Uses include rapid measurements of different antioxidant activities and optimum doses**

Examples of three antioxidants with different levels of antioxidant activity*

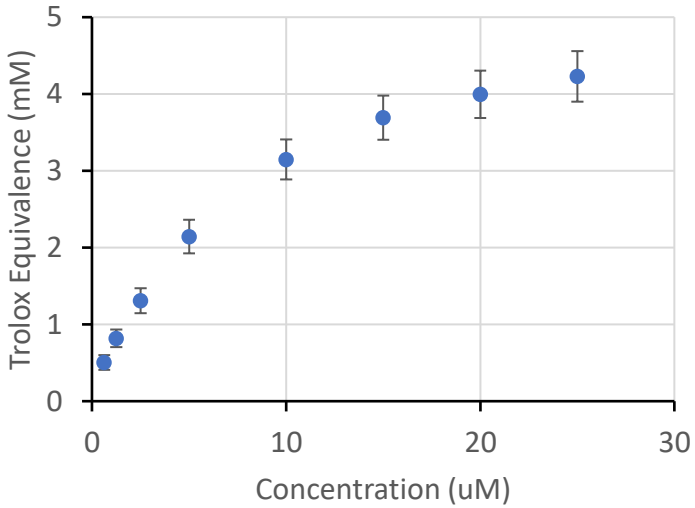
Low: Antioxidant no. 1



Moderate: Antioxidant no. 2



High: Antioxidant no. 3



***All data is expressed expressed as Trolox* equivalents. Trolox is the industry standard measure but takes ~24 hours and requires use of complex laboratory equipment**

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Felix™ System patents & trademarks

PATENTS

MEMPHASYS REFERENCE	APPLICANT	COUNTRY	TITLE	CASE STATUS	EXPIRY
Cell Separation	Memphasys Limited	US	Cell Separation	Granted (3 Jan 2012)	14-Jul-26
Electrophoresis Separation (CN)	Memphasys Limited	China	Electrophoresis Device	Granted (30 Aug 2022)	20-Oct-37
Electrophoresis Separation (JP)	Memphasys Limited	Japan	Electrophoresis Device	Granted (30 Jun 2022)	20-Oct-37
Electrophoresis Separation (US)	Memphasys Limited	US	Electrophoresis Device	Granted (11 Oct 2022)	09-Jul-38
Electrophoresis Separation (AU)	Memphasys Limited	Australia	Electrophoresis Device	Granted (30 Aug 2022)	20-Oct-37
Electrophoresis Sperm Separation (CN)	Memphasys Limited	China	Sperm separation by electrophoresis	Granted (24 Aug 2021)	20-Oct-37
Electrophoresis Sperm Separation (JP)	Memphasys Limited	Japan	Sperm separation by electrophoresis	Granted (13 Apr 2022)	20-Oct-37
Electrophoresis Sperm Separation (US)	Memphasys Limited	US	Sperm separation by electrophoresis	Granted (16 Mar 2021)	20-Oct-37
Electrophoresis Sperm Separation (AU)	Memphasys Limited	Australia	Sperm separation by electrophoresis	Granted (18 May 2023)	20-Oct-37
Membrane (US)	Memphasys Limited	US	Biocompatible Polymeric Membranes	Granted (30 Mar 2021)	15-Aug-37
Newcastle Uni (AU)	The University of Newcastle Research Associates Limited [1]	Australia	Sperm cell separation by electrophoresis	Granted (20 Sep 2007)	07-Oct-24
Newcastle Uni (UK)	The University of Newcastle Research Associates Limited [1]	UK	Sperm cell separation by electrophoresis	Granted (4 Mar 2009)	07-Oct-24
Newcastle Uni (US)	The University of Newcastle Research Associates Limited [1]	US	Sperm cell separation by electrophoresis	Granted (28 Feb 2012)	01-Feb-27

TRADEMARKS

The Felix™ System trademark is registered in Australia, United States, United Kingdom, European Union, India, Japan and Canada

[1] MEM has sole & irrevocable, perpetual license for commercial use of patent under its core 2016 licensing agreement with the UoN under which it pays a small royalty to the University on net sales.

Financial snapshot as of 15 September 2023

KEY DATA[1]	A$
Share price	0.015
Shares on issue	959.5M
Market capitalisation	14.4M

OWNERSHIP STRUCTURE[1]	%
Peters Investments	27.2
A Goodall	18.7
A Coutts	8.8
Top 20	55.6

CONVERTIBLE NOTES	
Peters Investments	3M (at A$3M face value & maturity as at 31 December 2023)

1 Source: ASX website
2 As at 31 March 2023

Experienced leadership team

Robert Cooke
CHAIRMAN

Alison Coutts
CEO

Paul Wright
NE DIRECTOR

Andrew Goodall
NE DIRECTOR

Professor John Aitken
DIRECTOR RESEARCH

Pablo Neyertz
DIRECTOR FINANCE

Dr. David Ali
DIRECTOR BUSINESS DEVELOPMENT

Assoc. Prof. Hassan Bakos
DIRECTOR OPERATIONS