

## State of the ART: Improving Fertility Treatment through Research and Technological Innovation



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## Fertility management in 2019



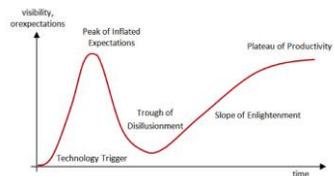
The demand for fertility treatment is on the rise

## Research focused on improving outcome



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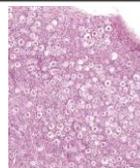
The Gartner Hype Curve



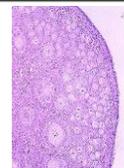
## From hype to actual clinical value

- AMH: setting things straight
- Oocyte freezing: keeping it real
- State of the ART: technological innovations that improve safety and efficacy for patients

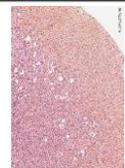
## AMH & Ovarian reserve in humans



Infant



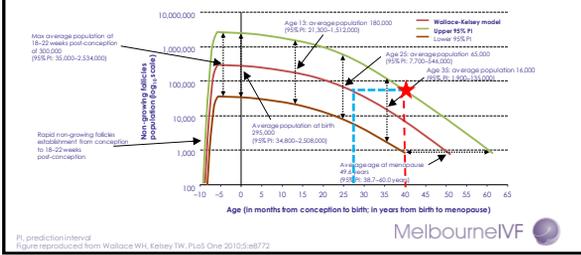
Reproductive age



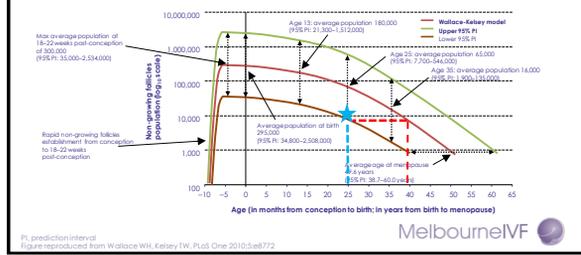
Menopause

Dramatic loss of primordial follicles with advancing age

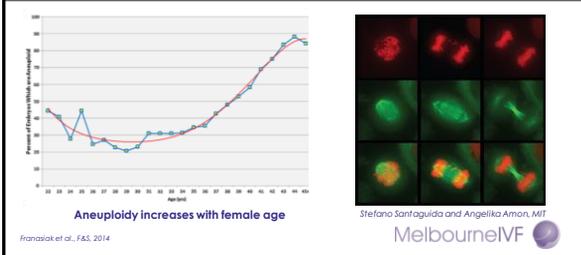
## AMH & Ovarian reserve in humans



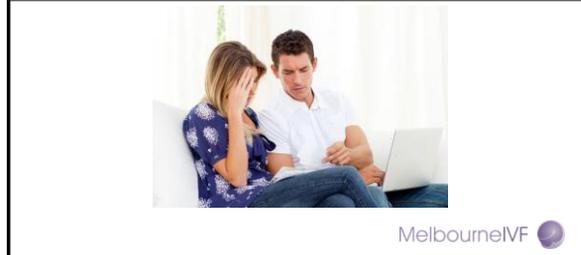
## AMH & Ovarian reserve in humans



## What about egg quality?



## AMH: a blessing or a curse?



## AMH: a blessing or a curse?

Nicole (late 20s)

Nicole thought it would be useful to do the test. She hoped it would buy her some time, or put the subject off the agenda once and for all. So off she went to the GP to ask for one.

## AMH: a blessing or a curse?

Nicole (late 20s)

Her results were very low.

The doctor told her she would have difficulty conceiving and immediately referred her to an IVF clinic.

"I remember leaving the GP — it was my lunch break at work — and I couldn't go back to work," Nicole says.

"I remember just wandering around the shops aimlessly, thinking 'what does this mean for my relationship?'"

<https://www.abc.net.au/news/science/2018-11-04/egg-timer-fertility-test-your-story/1042804>

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## Issues with AMH measurement?

### Inter-individual factors



- Age
- Ovarian surgery/ Endometriosis/ Prior gonadotoxic chemotherapy
- Ethnicity (Chinese, Black African, Hispanic and South Asian < Caucasian)
- Smoking
- Pregnancy, GnRH analogues, combined hormonal contraceptives
- Chronic disease/ malignancies

### Intra-individual factors

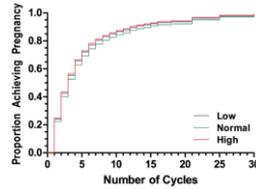


- Minimal cyclic variation during the menstrual cycle (late follicular phase)
- Low variability between menstrual cycles

AMH, anti-Müllerian hormone; GnRH, gonadotropin-releasing hormone; Devailly D, et al. Hum Reprod Update, 2014;3(7):65; Escaramil S, et al. Hum Reprod Update, 2015;21:698-710; McCrindle L, et al. Reprod Biomed Online, 2017;34:429-439

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## What AMH does not reveal?



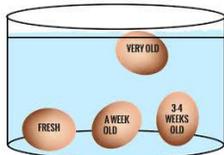
Prospective study  
N=1202: 18-40yo with 1-2 pregnancy losses  
Actively attempting to conceive  
F/U: up to 30 menstrual cycles

No association between AMH levels and fecundability

Zarek et al., 2015, JCEM

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## Is there a measure of oocyte quality?



There is no reliable way to measure oocyte quality without performing ART

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## What AMH **does** reveal?

Low or high ovarian reserve

Indicative of time to menopause

Response to ovarian stimulation

*Rarely might be indicative of Granulosa Cell Tumour*

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## Patient with low AMH: What to do?



- Ensure not on the OCP or other forms of HC
- Low but how low? Always adjust for age
- <5<sup>th</sup> centile: consider genetic testing (karyotype/ Fragile X syndrome)
- Advise to complete family ASAP
- Consider referring to Fertility Specialist

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## AMH: a blessing or a curse?



Nicole (late 20s)

*"After a whole lot of tests that all "came out fine", the fertility specialist suggested the couple should try to conceive naturally."*

*After two months of trying, Nicole got pregnant and has since given birth twice, which she says seems to be "the exact opposite of what the [AMH] test indicated".*

<https://www.abc.net.au/news/science/2018-11-04/egg-timer-fertility-test-your-stories/1042804>

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## Oocyte freezing: keeping it real

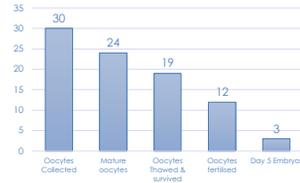


Is social egg freezing the future?

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## Oocyte freezing: keeping it real

### How many eggs do I need?



Depending on age a day 5 embryo could have a 5-40% implantation rate

Hence 3x Day 5 embryos for a 34 year old (30% IR) translate to ~60% CLBR

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## Oocyte freezing: Main messages



There is no guarantee that a live birth will occur



Oocyte freezing is far more successful in younger women (usually ≤36 years old)



The more eggs the better

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## IVF in 2020: technological innovation



- Optimising culture environment
- Selecting the best embryo
- Shortening time-to-pregnancy

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## Time-lapse in the IVF laboratory

Photographs taken every 5-20 mins

Uninterrupted culture

More information regarding embryo growth and development

Stable culture environment



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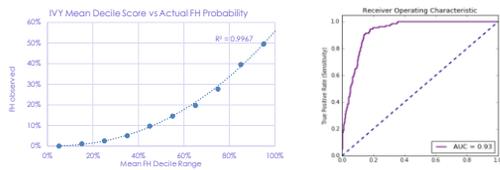
## The future: selecting the best embryo



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## IVY: selecting the best embryo

### Artificial Neural Network predicting clinical pregnancy



Trons et al., 2018, ASRM

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## Main Messages

- Ovarian reserve assessment using AMH is useful but it should be performed & interpreted appropriately
- Low AMH does not mean low fertility
- However, it can indicate that time is running out

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## Main Messages

- Social oocyte freezing is a modern tool that can help some women achieve their life goals
- Younger women have much higher success rates but are also less likely to use their cryopreserved eggs
- Women should be consulted about the realistic chances of success with oocyte freezing

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## Thank you

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