

SELF-COLLECTION STRATEGIES FOR NONINVASIVE BIOSPECIMENS IN THE TIME OF COVID-19: OPPORTUNITIES AND GUIDELINES

ELIZABETH (BIRDIE) SHIRTCLIFF

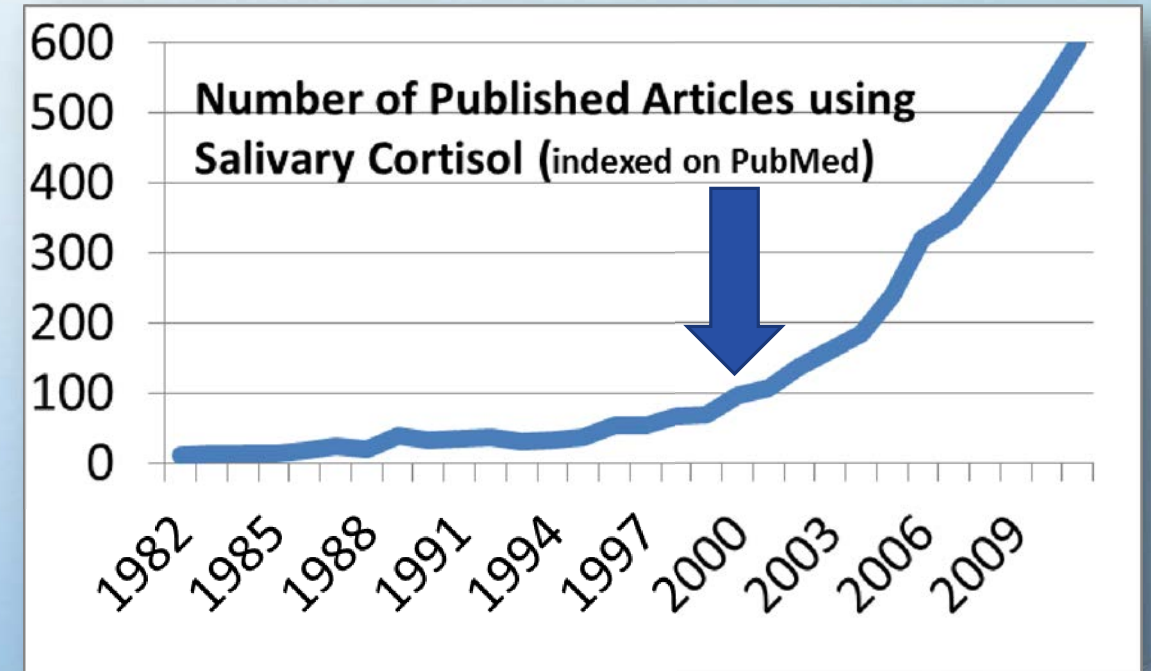
SPIT LAB DIRECTOR

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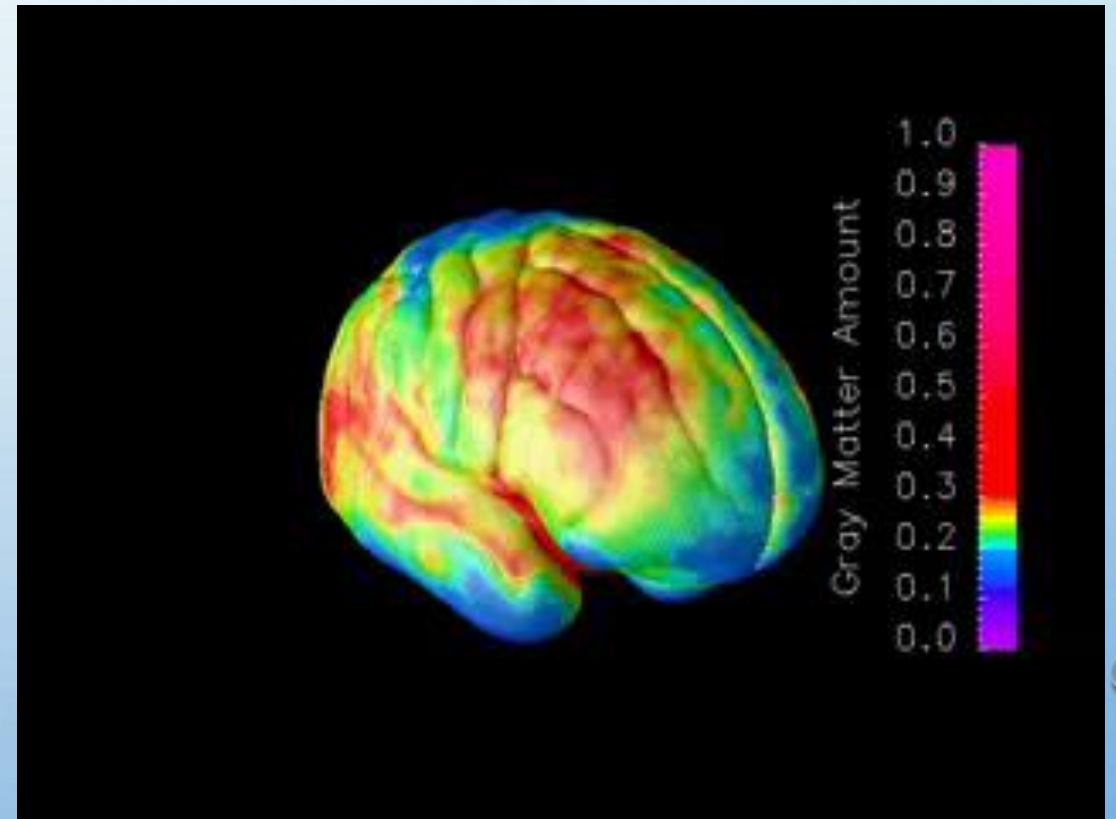
SALIVA: A BRIEF HISTORY

- OTHER BIOSPECIMENS
 - BLOOD
 - URINE
 - CSF
- CORTISOL PAVED WAY FOR OTHER HORMONES
 - TESTOSTERONE
 - DHEA
 - ESTRADIOL, ETC.



SALIVA: STRENGTHS

- STEROIDS GO EVERYWHERE!
 - MUST BE MANUFACTURED
 - LOCK-AND-KEY
 - LIPID SOLUBLE
 - ACINAR CELLS
 - BLOOD BRAIN BARRIER
 - CELL NUCLEI
- FREE VS BOUND HORMONES
 - BIOLOGICALLY ACTIVE FRACTION.
 - CARRIER PROTEINS



SALIVA: STRENGTHS

- SALIVA COLLECTION IS STRAIGHTFORWARD.
 - SUBJECTS CAN COLLECT IT THEMSELVES.
 - COLLECTION CAN TAKE PLACE IN A VARIETY OF LOCATIONS.
 - POINT-OF-CARE
 - NOT STRESSFUL OR INVASIVE.
- REPEATED MEASURES FEASIBLE





ECHO

Environmental influences
on Child Health Outcomes

A program supported by the NIH

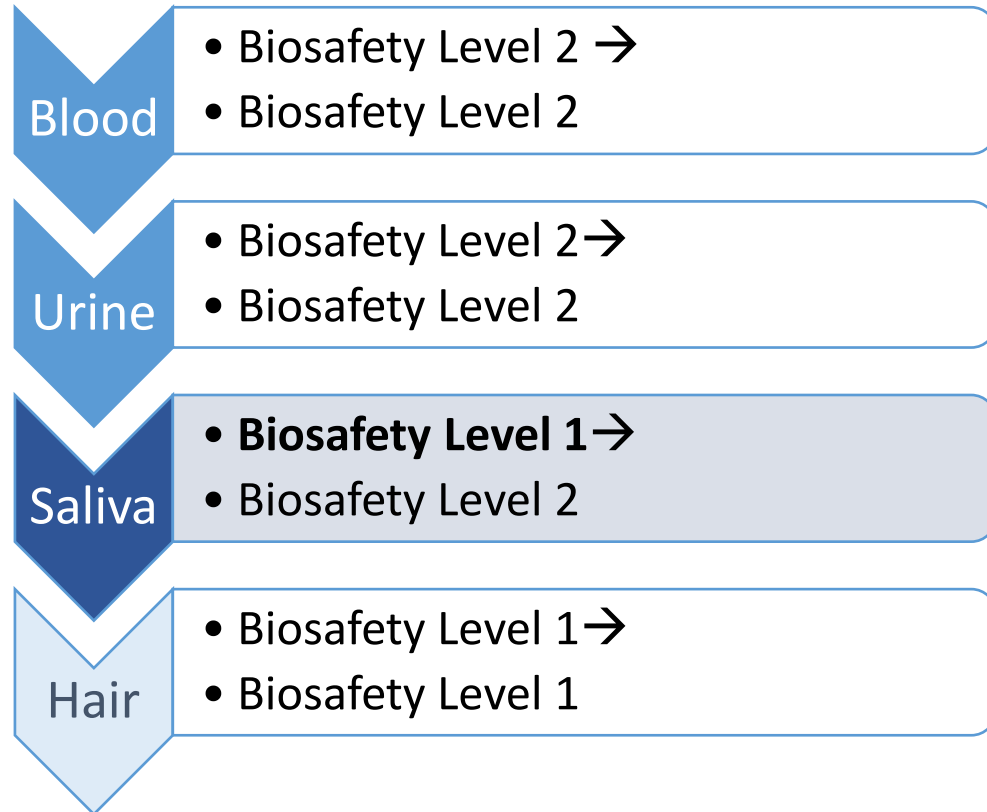
COVID-19

<https://www.nih.gov/research-training/environmental-influences-child-health-outcomes-echo-program>

seven-year research initiative, aims to determine what factors give children the highest probability of achieving the best health outcomes over their lifetimes.

To find answers to vital unanswered questions, ECHO taps into existing cohorts totaling about 50,000 children from racially, socioeconomically and geographically diverse backgrounds.

Biospecimens during COVID-19



BS1

Gloves

Lab Coat recommended

General Lab Safety

BS2

BS1 and...

Safe Sharps

Face protection

Biosafety cabinet or other aerosol containment

Recommendation for controlled air flow

Biospecimens during COVID-19

(CDC recommendations)

- Universal Precautions are best practice for infection control from all biospecimens
- Follow Standard Precautions when handling clinical specimens. Standard Precautions include hand hygiene and use of PPE, such as laboratory coats or gowns, gloves, and eye protection.
- Precautions should be taken in handling specimens that are suspected or confirmed for SARS-CoV-2. Timely communication between clinical and laboratory staff is essential to minimize the risk incurred in handling specimens from patients with possible SARS-CoV-2 infection. *Such specimens should be labeled accordingly, and the laboratory should be alerted to ensure proper specimen handling.*
- For procedures with a high likelihood to generate aerosols or droplets, use either a certified Class II Type A1 or A2 BSC or additional precautions to provide a barrier between the specimen and personnel.
EG: PPE, such as a surgical mask or face shield, or other physical barriers, like a splash shield; centrifuge safety cups; and sealed centrifuge rotors.

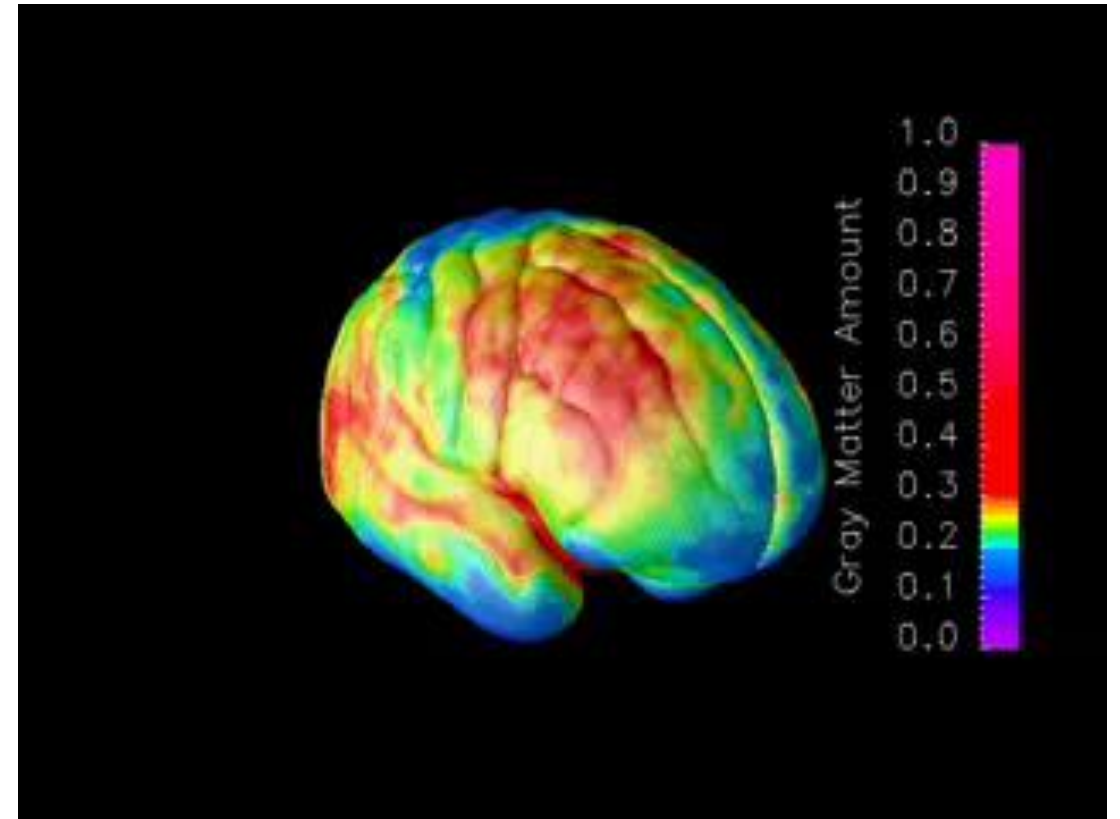


HAIR!

What is the idea?

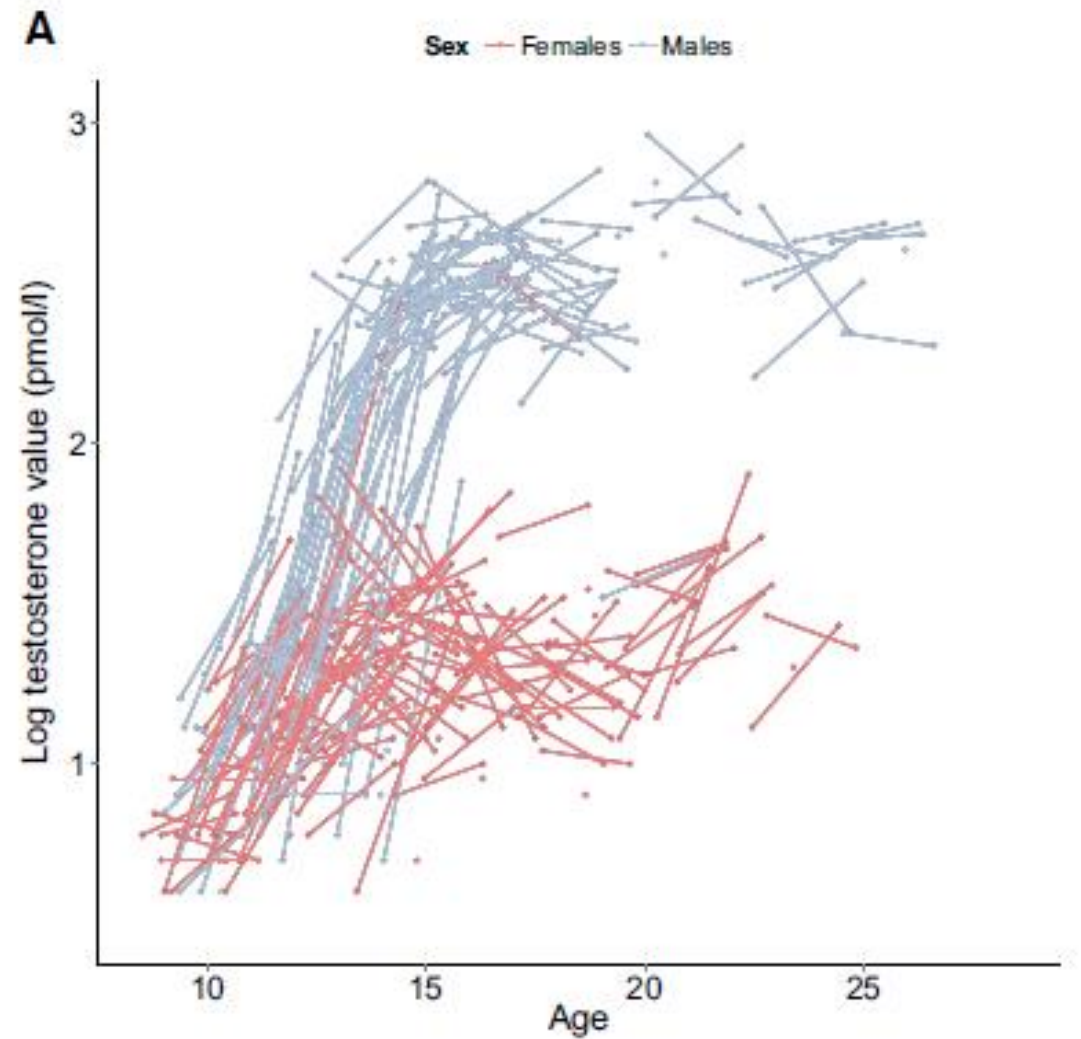
Brain maturation continues well
into 20s

Rate of maturation influenced
by puberty



What is the idea?

Puberty is driven by hormones
Hormones continue to change
long after “adult-like”



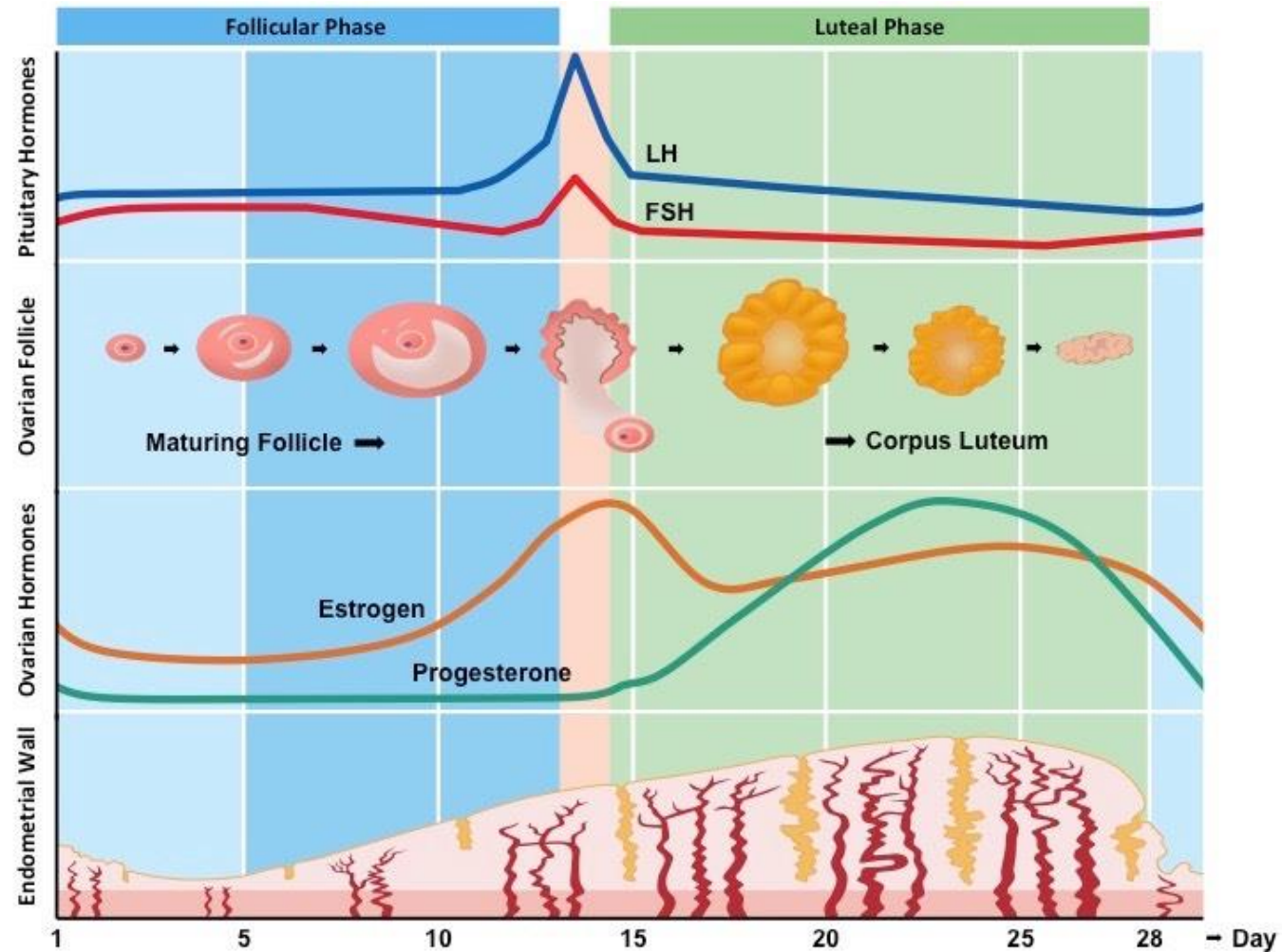
What is the idea?

Hormones are highly variable

With a day

Across days

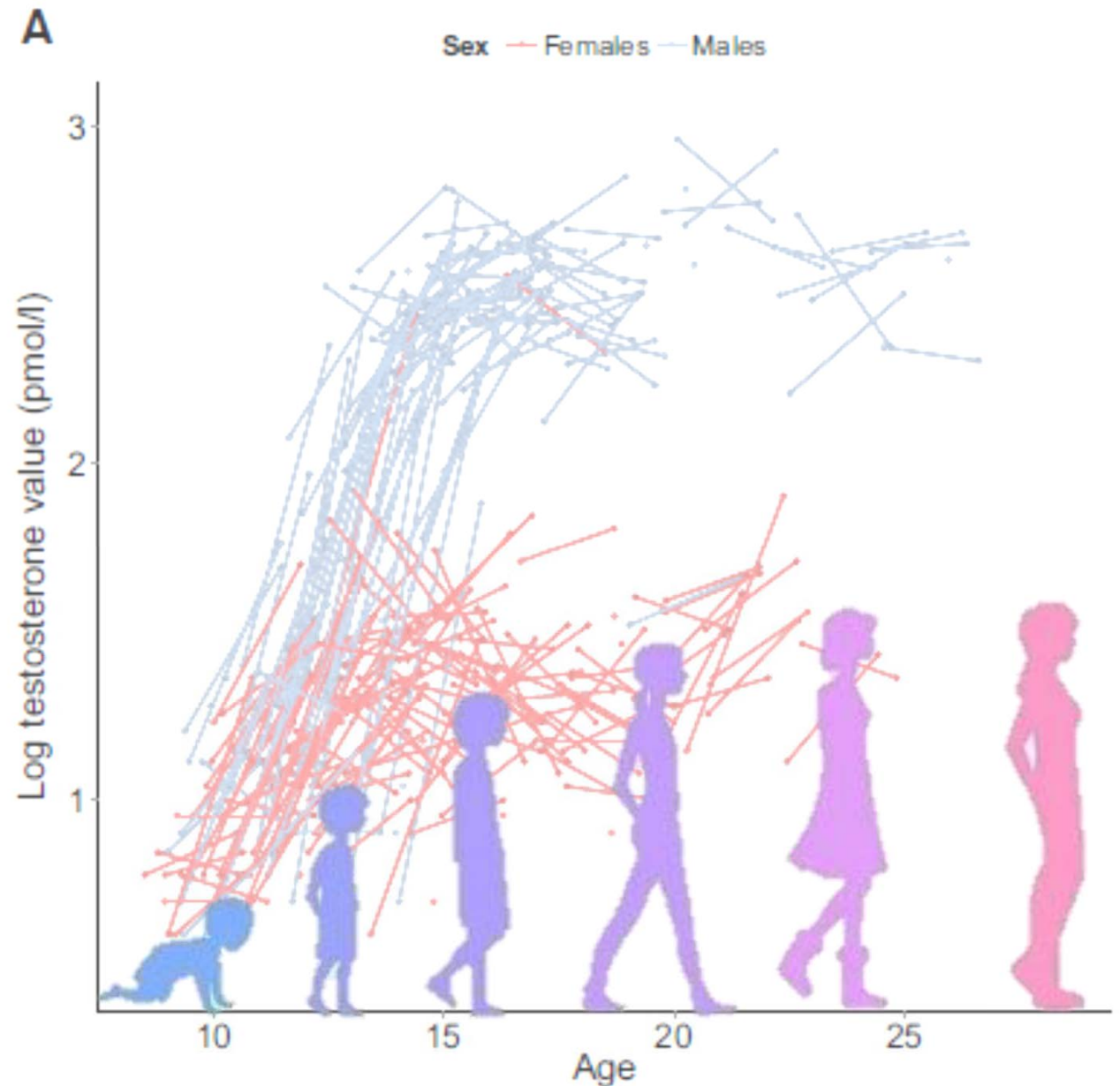
Across menstrual cycle



What is the need?

Hormone Measure that does not get overwhelmed by momentary variance

Hormone Measure that matches the timescale of development



What fills the need?

Hair captures 1-3 month of hormones

Matches the timescale of Development

Noninvasive

Passive diffusion

Biologically active

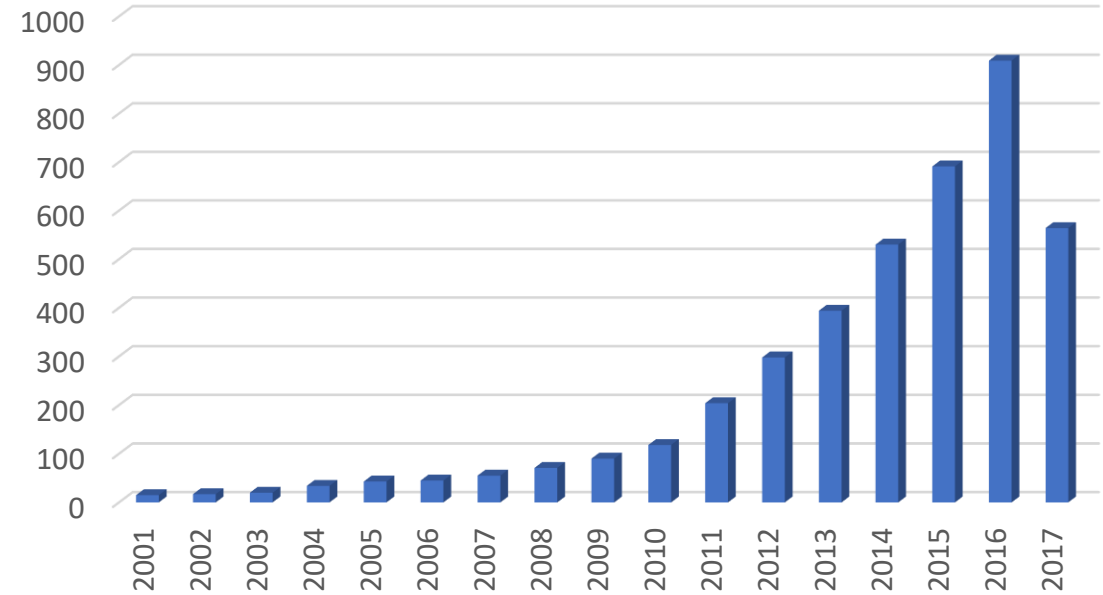


What is Commercial need?

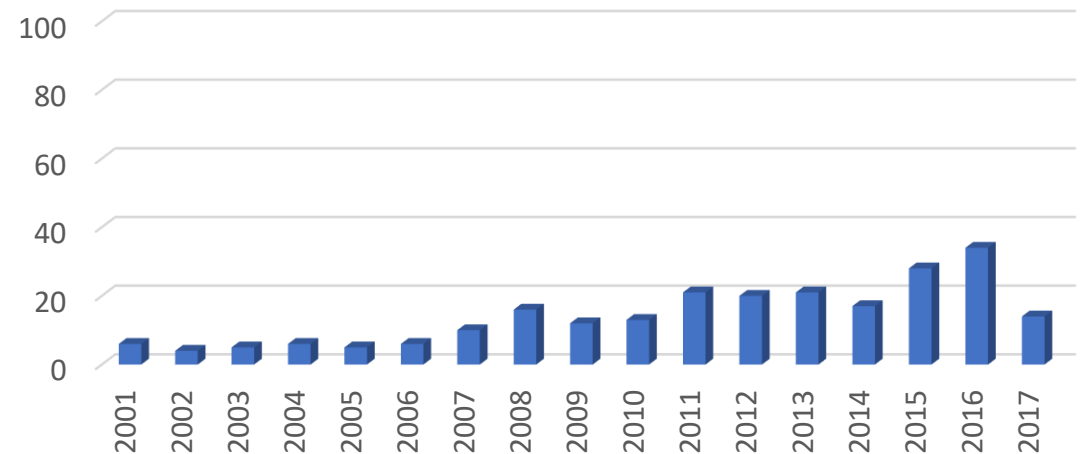
By Analogy, Hair Cortisol is growing market

Hormone Measure that matches the timescale of development

Hair Cortisol Papers Published



Papers Published that mention Hair Testosterone



TIME TO BE A BARBER

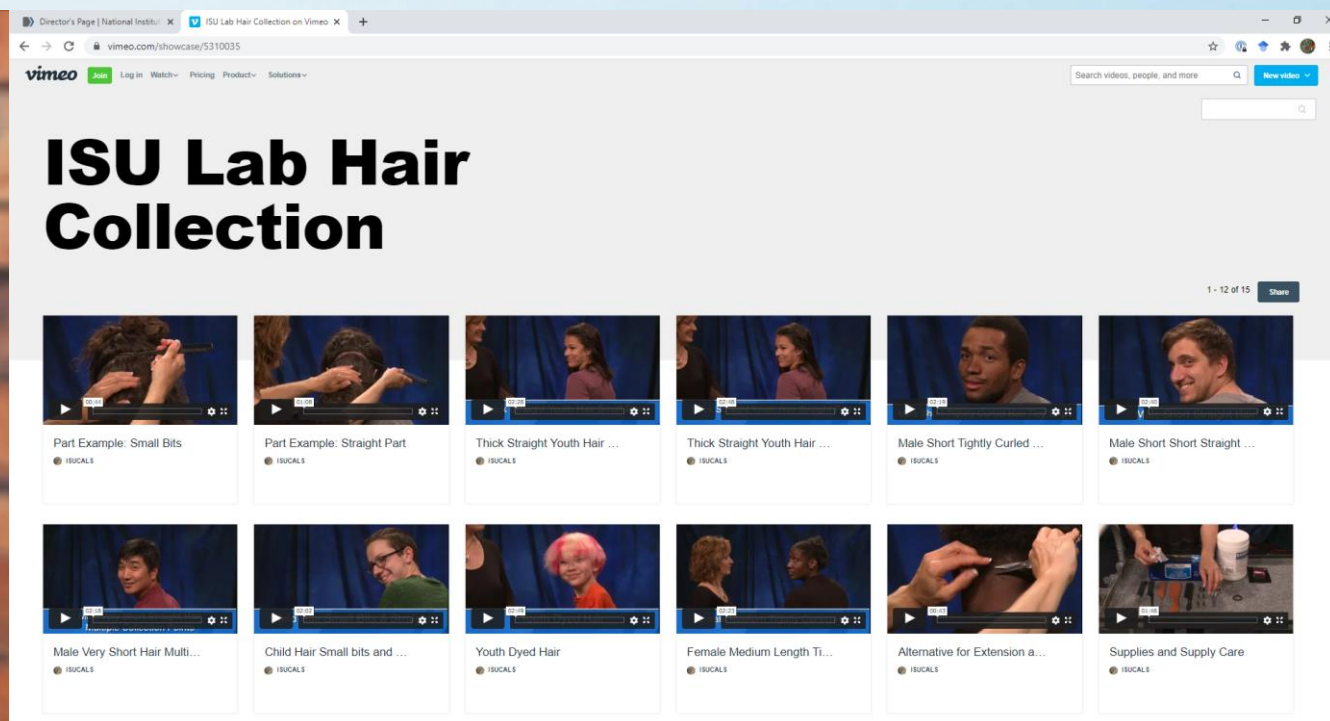


**Small bits hair
collection
method**



**Straight-line
hair collection
method**

[HTTPS://VIMEO.COM/SHOWCASE/5310035](https://vimeo.com/showcase/5310035)



QUALITY CUT CLOSE TO THE SCALP

#1



#3



#5



#2



#4



QUALITY PLACEMENT IN FOIL SHEETS

Example 1. Good example of long hair



Example 2. Good example of short hair



- PLACE HAIR SAMPLES IN A FOIL PACKET (SEE EXAMPLES).
 - FOR LONGER HAIR, LOOP THE SAMPLE WITHOUT BENDING THE HAIR SHARPLY (SEE EXAMPLE 1 & 9).
 - CLEARLY DELINEATE THE SCALP END OF THE HAIR BY BANDING THE HAIR NEAR THE SCALP END, NOTING THE SCALP END MARKER ON THE FOIL, OR PREFERABLY BOTH (SEE EXAMPLE 1 & 2).

GETTING READY TO SHIP

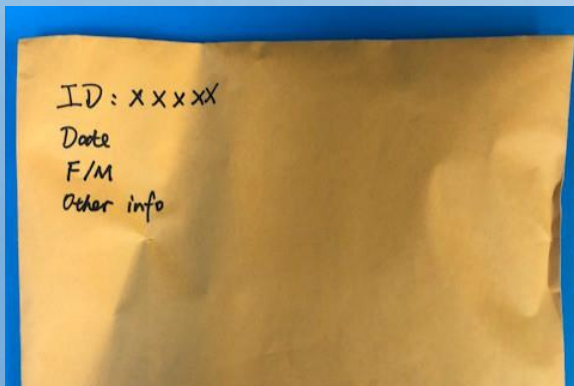
Example 3. Example of foil envelope



Example 4.
Example of labeled foil envelope



Example 5. Example of envelope



- FOLD THE FOIL PACKET SUCH THAT IT MAKES AN ENVELOPE OVER THE HAIR (SEE EXAMPLE 3).
- LABEL THE FOIL ENVELOPE WITH ALL RELEVANT SAMPLE INFORMATION (SEE EXAMPLE 4).
- LABEL THE MANILA ENVELOPE (SEE EXAMPLE 5).
- KEEP THE SAMPLE AT ROOM TEMPERATURE.
- LABEL SAMPLES IN A CLEAR AND LEGIBLE MANNER.
 - PLEASE INCLUDE PARTICIPANT GENDER WHEN POSSIBLE.
- PLEASE USE A TRACKED SHIPPING METHOD.

Example 6. Wrong example of sealed foil envelope



WHAT NOT TO DO...

Example 7. Wrong example of taped long hair



Example 8. Wrong example of taped short hair

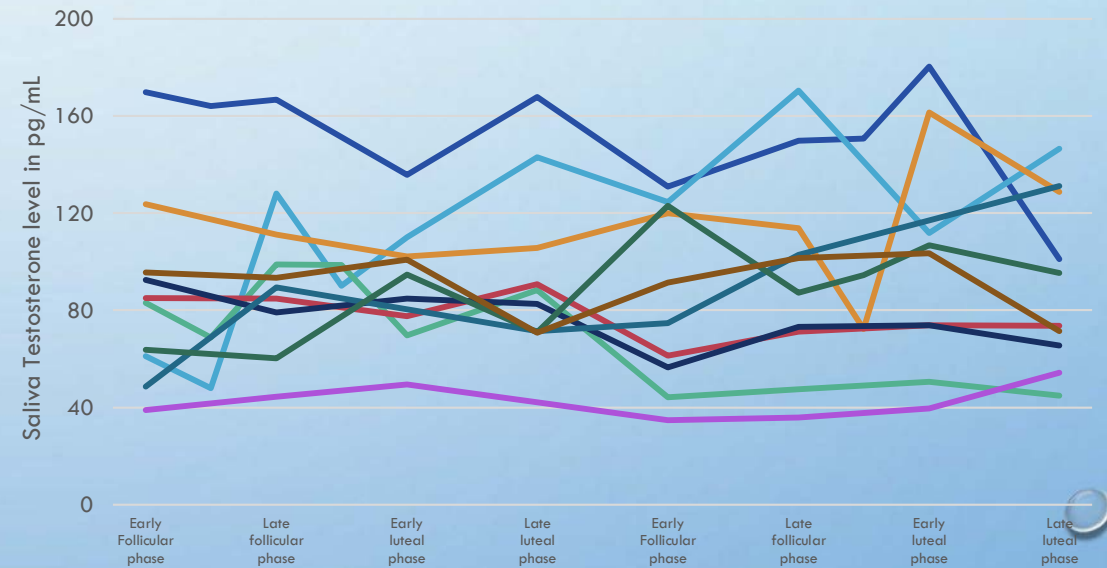
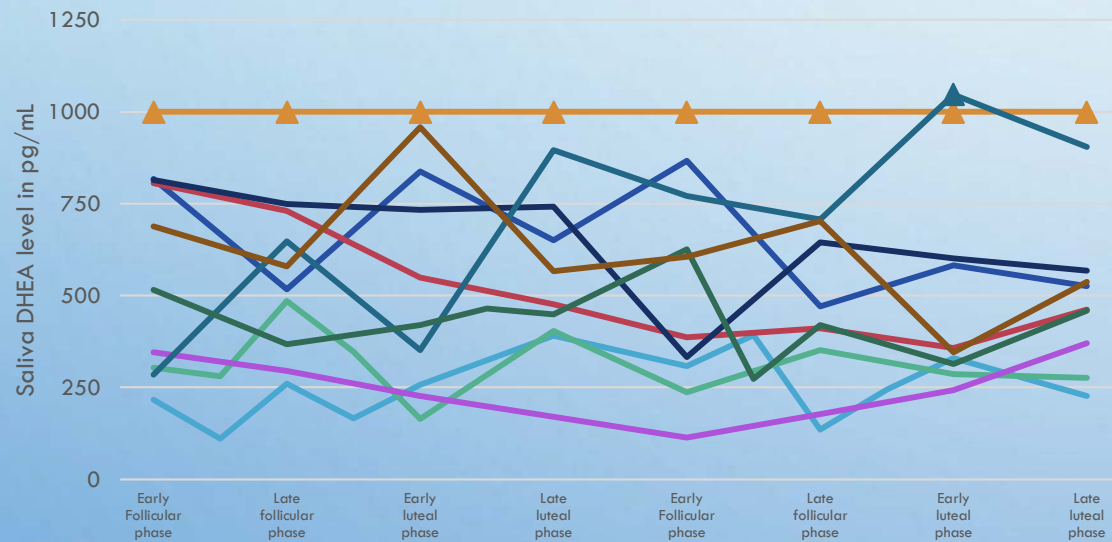


Example 9. Wrong sample of over-bent long hair



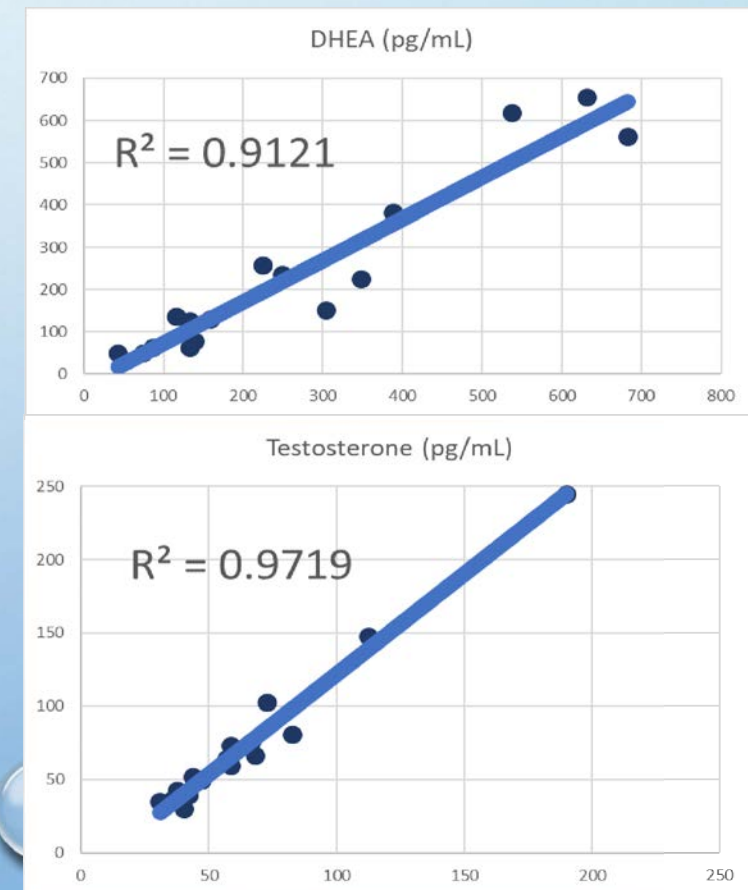
- PLEASE DO NOT LACE A LABEL OVER THE EDGE OF THE FOIL (THIS WILL HAVE TO BE CUT AND PARTICIPANT INFORMATION WILL BE LOST) (SEE EXAMPLE 6).
- PLEASE DO NOT TAPE, GLUE OR OTHERWISE USE ADHESIVES TO ATTACH THE HAIR TO THE FOIL (SEE EXAMPLE 7 & 8).
- PLEASE DO NOT USE BIOHAZARD BAGS.
- PLEASE DO NOT SHIP HAIR WITH SALIVA.

DID HAIR HELP?



DID HAIR HELP?

- STRONG CORRELATIONS OF ONE SEGMENT TO THE NEXT (COLLECTED ONE MONTH LATER)
- SIGNIFICANT CORRELATIONS WITH SALIVA WHEN SALIVA WAS AVERAGED
- SOOOOO MANY FUTURE DIRECTIONS



SO DID I MENTION SWEAT?



The background of the slide is a light blue gradient, transitioning from a slightly lighter shade at the top to a slightly darker shade at the bottom. Scattered across this background are numerous water droplets of various sizes. Some droplets are large and prominent, while others are small and subtle. They are rendered with realistic shading and highlights, giving them a three-dimensional appearance. The droplets are concentrated more towards the top and bottom edges, leaving the center area relatively clear.

QUESTIONS?