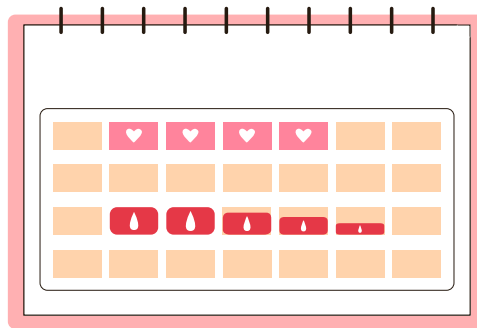




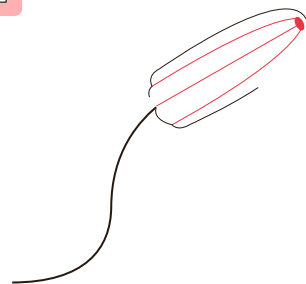
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# MENSTRUAL GARDEN



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Jiabao Li, Cooper Galvin



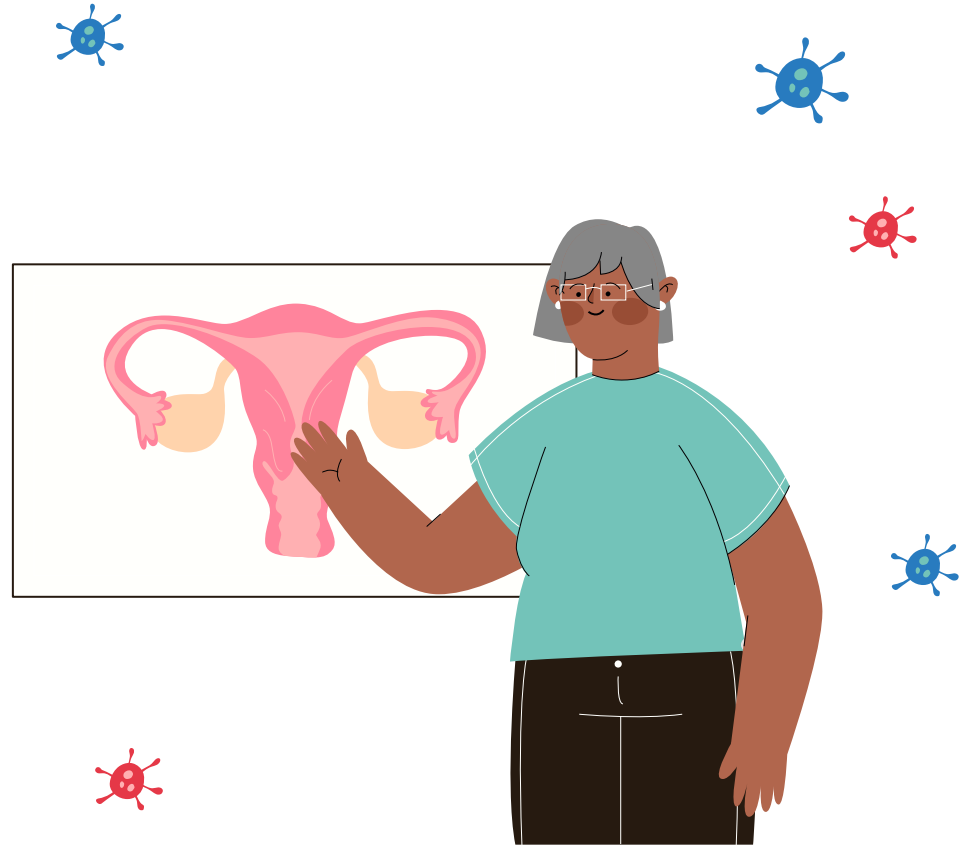




# BACKGROUND

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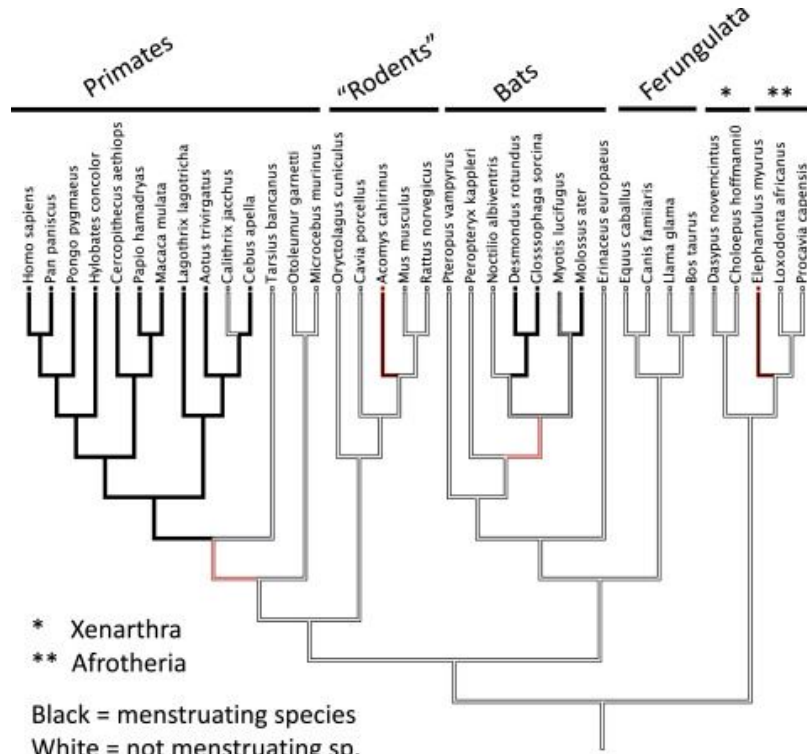
Why do some of us menstruate? What is in it?



# WHO ELSE MENSTRUATES?

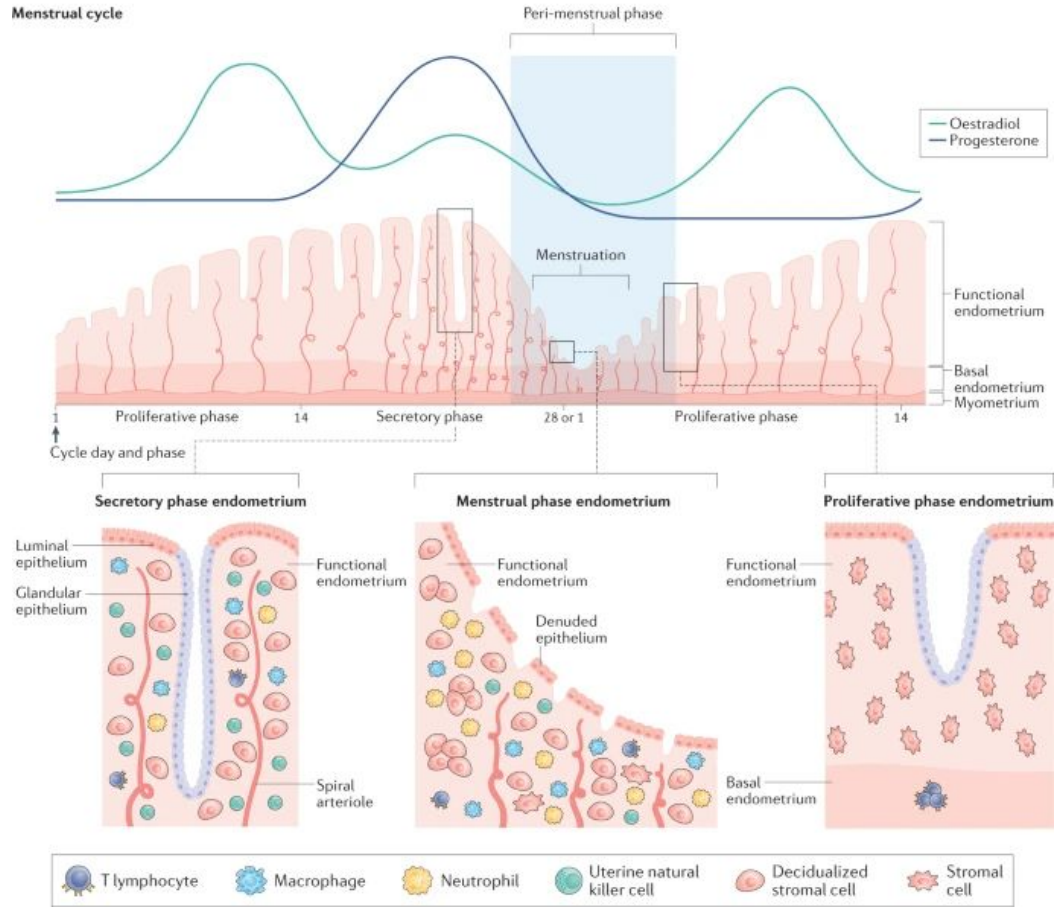
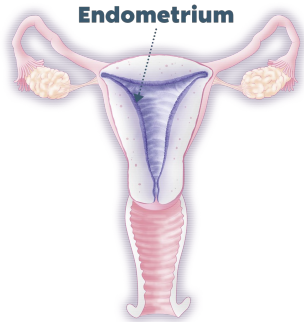


# WHO ELSE MENSTRUATES?



Black = menstruating species  
 White = not menstruating sp.  
 Red outline: likely origins of menstruation







**WHY THOUGH??**



# WHY THOUGH??



**SPERM ARE GROSS**

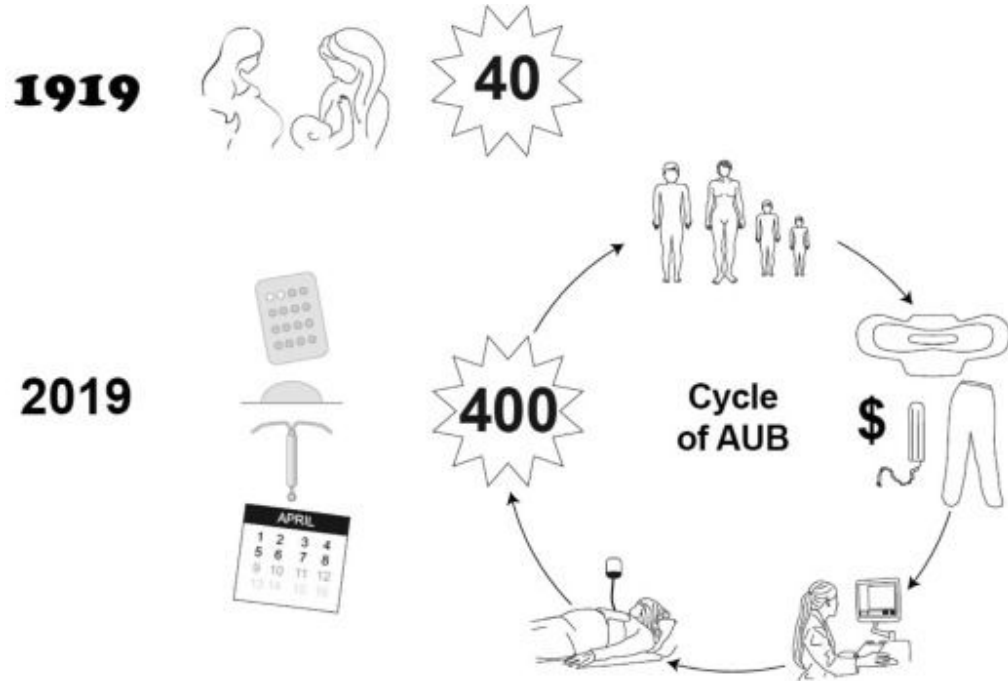
**ENERGY CONSERVATION**

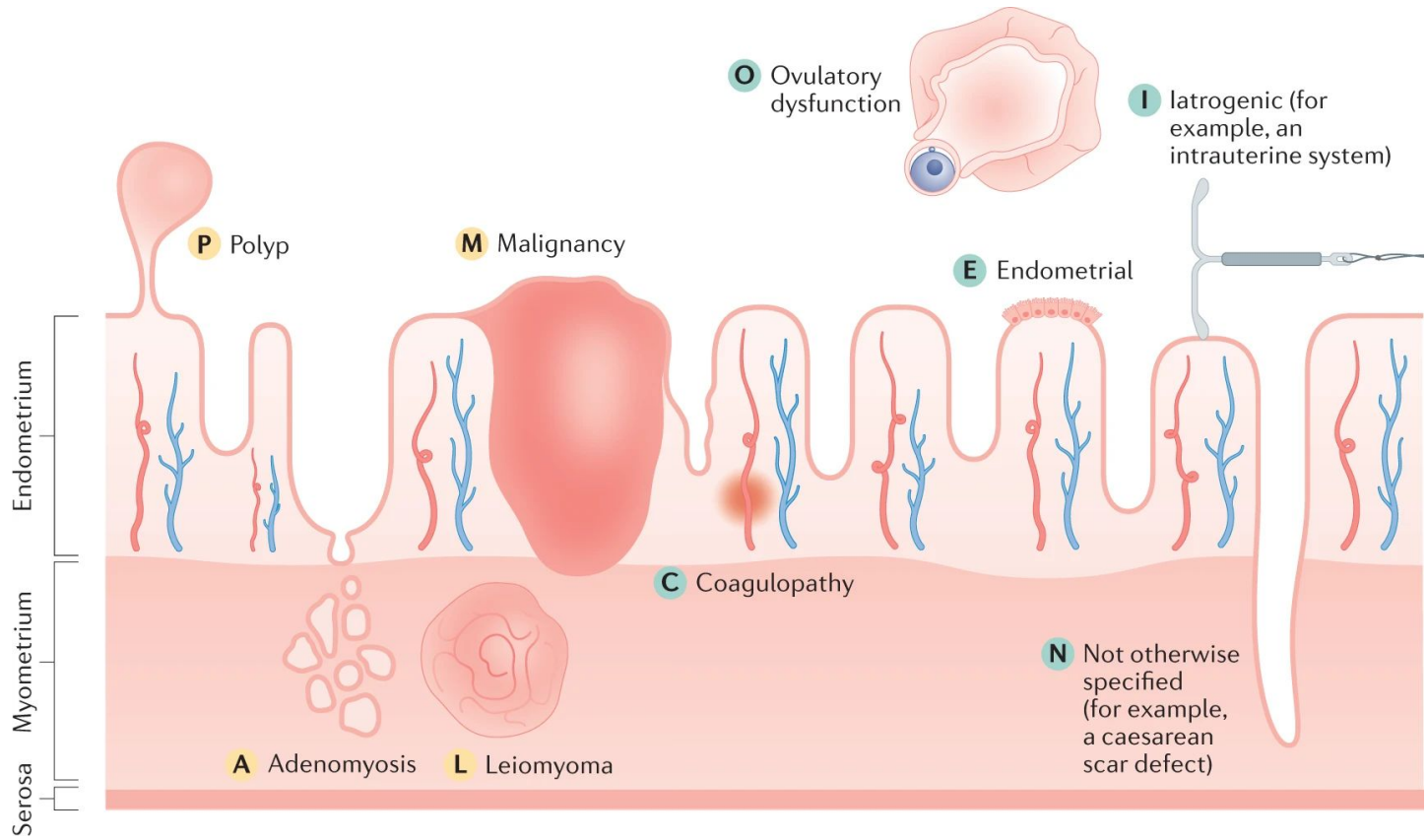
**PLACENTIATION**

**ACCIDENT?**

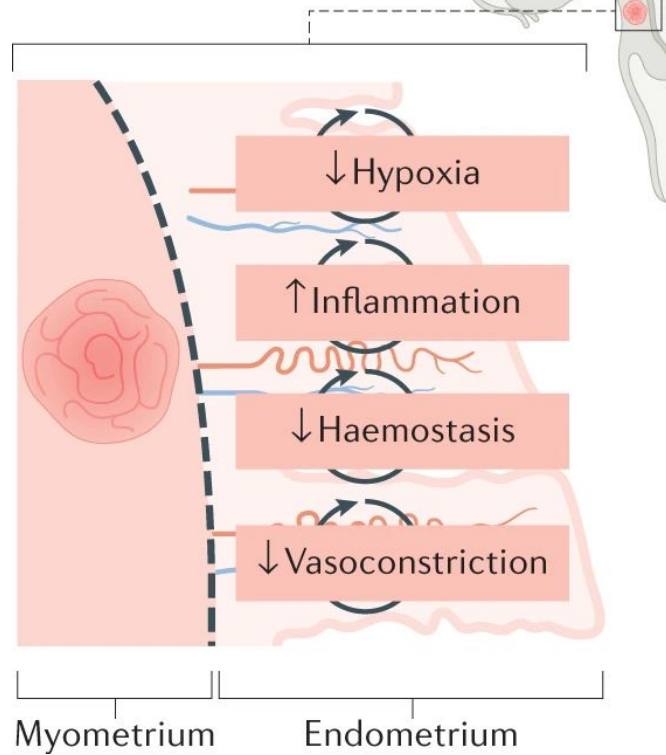


# WHEN DOES MENSTRUATION GO WRONG?





## Primary endometrial disorder





# WHAT IS IN MENSTRUAL EFFLUENT?

| DESCRIPTION   | VENOUS BLOOD   | MENSTRUAL EFFLUENT  |
|---|--|---|
| <b>Blood content</b>  | All blood  | <35-50% venous blood  |
| <b>Clotting factors</b>   | Blood tissue agglomerator proteins present                     | Absent but presence of metalloproteinases that catalyze endometrial breakdown |
| <b>pH indicating serum content of fluid</b>                                   | 7.2  | Median range of pH 5-6  |
| <b>Viscosity: Note varies across dramatically depending on menstrual flow</b> | Similar to menstrual discharge when menstrual flow is greatest | 4 times more viscous than venous blood and 35 times as viscous as water       |
| <b>Stem Cells</b>   | Absent   | Pluripotent stem cells present that can be harvested for many purposes        |

# WHAT GIVES MENSTRUAL BLOOD ITS UNIQUE SMELL?

## STAGNANT

Depends more on the microbial contents in the cervic/vagina that digeset the effluent

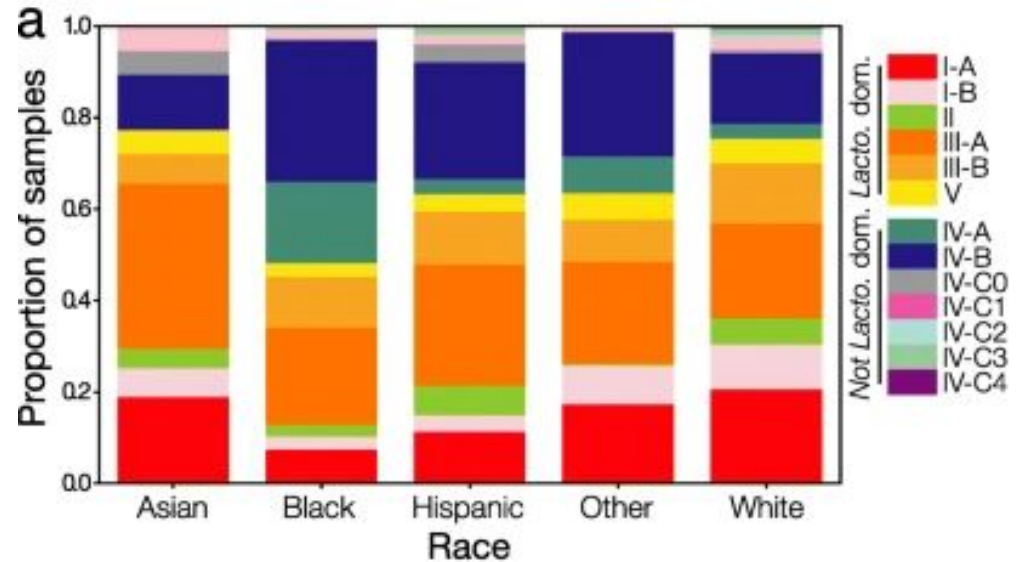
## FRESH

Depends on health/quality of menstruation



# MOST VAGINAS ARE ACIDIC AND LACTOBACILLUS DOMINATED

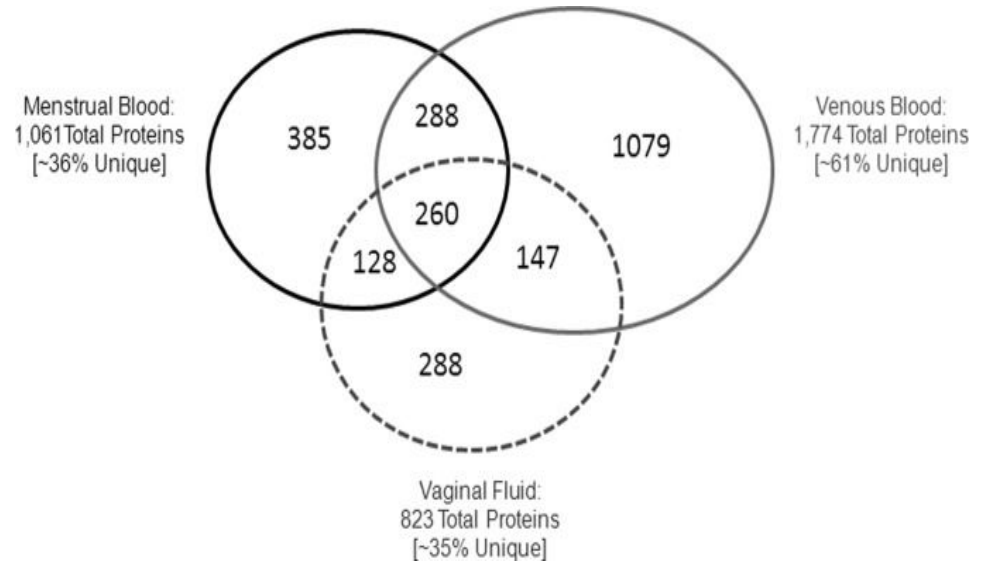
Researchers have found  
there are ~10 dominant  
types of vaginal microbial  
communities



# WHAT IS IN MENSTRUAL EFFLUENT?

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One study, one patient, one  
menstruation, 2011



Yang, Heyi, Bo Zhou, Mechthild Prinz, and Donald Siegel. 2012. "Proteomic Analysis of Menstrual Blood." *Molecular & Cellular Proteomics: MCP* 11 (10): 1024–35.



# WHAT DO THE PROTEINS DO IN MENSTRUAL EFFLUENT?

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One study, one patient, one  
menstruation, 2011

Major related functions:

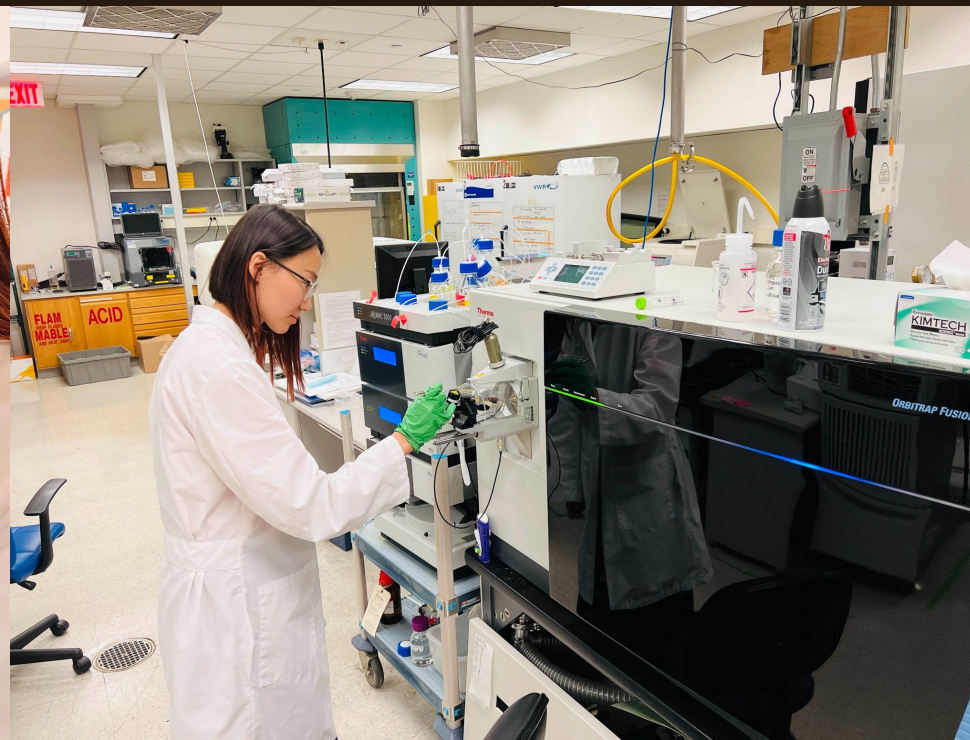
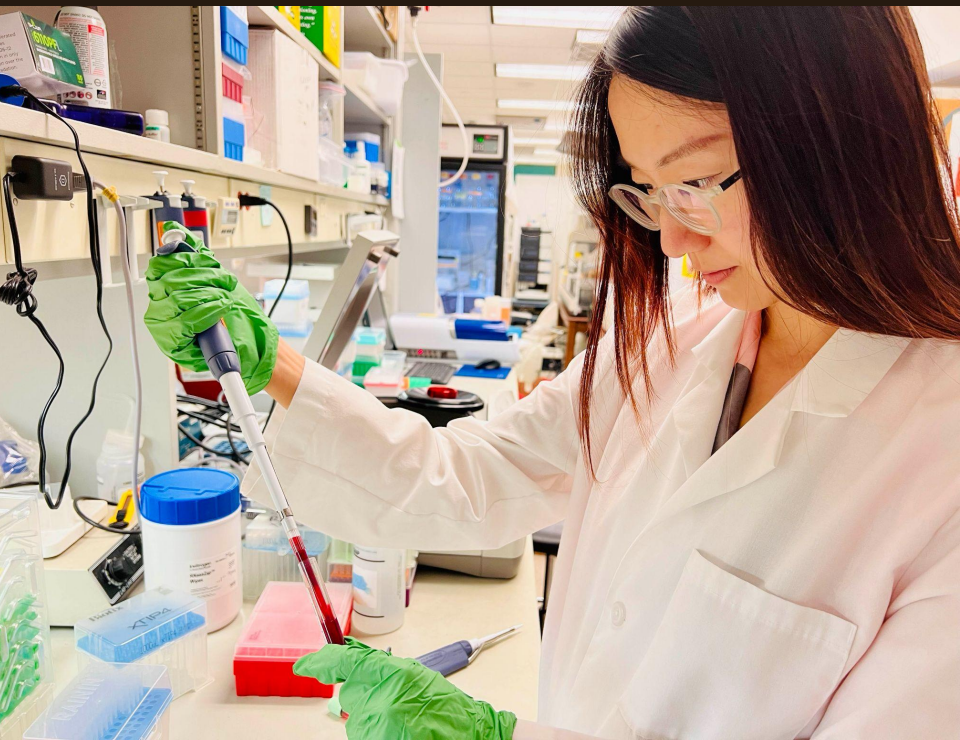
- Hematopoiesis\*
- Apoptosis
- Cell proliferation/migration
- Reproduction

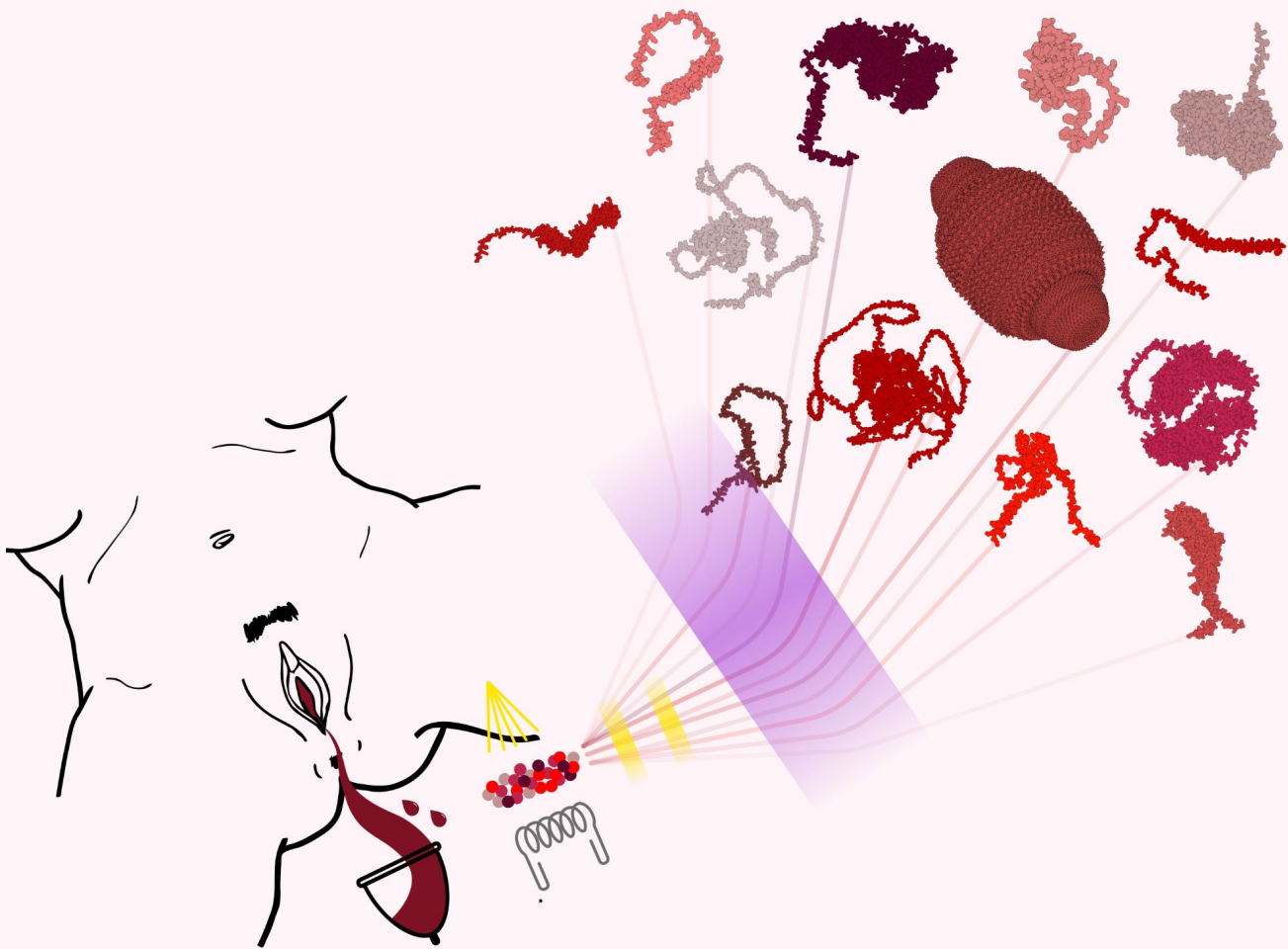
# WHAT IS IN MENSTRUAL EFFLUENT?

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One patient, several  
days/cycle, at least 6 cycles







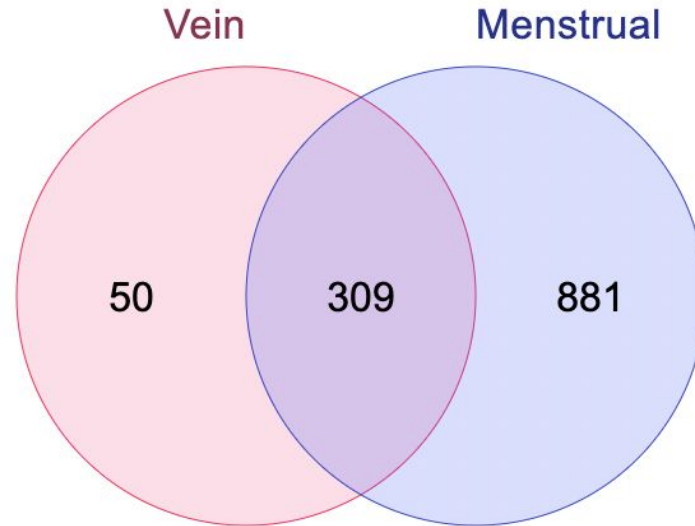


# VENOUS BLOOD LACKS **MOST MENSTRUAL PROTEINS**

## MENSTRUAL BLOOD IS A RICH PROTEIN SAMPLE

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The vast majority of venous blood proteins can be found in menstrual blood  
**BUT the majority of menstrual blood proteins cannot be found in venous blood**



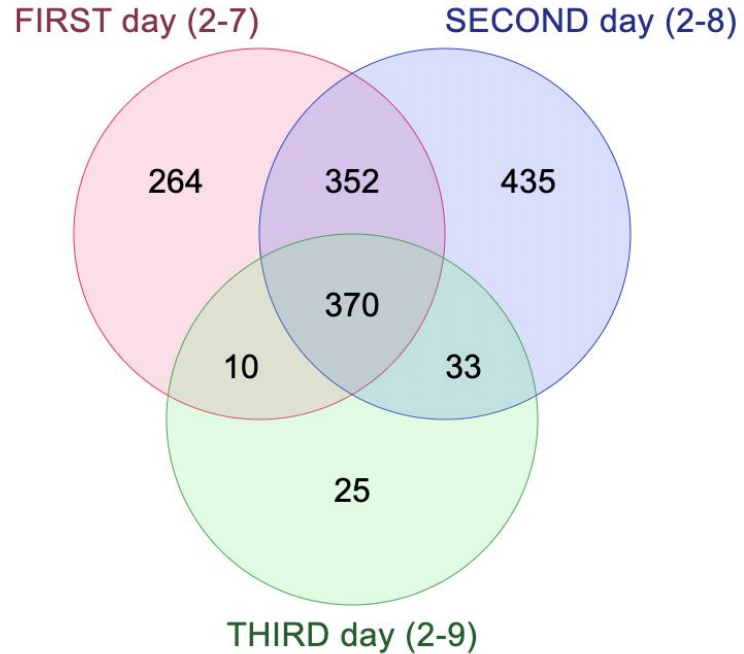
# WITHIN A MONTH CONSISTENCY IN MENSTRUAL PROTEINS

**MAJORITY OF PROTEINS  
REMAINED CONSISTENT  
FIRST TWO DAYS, BUT  
DROPPED THIRD DAY**

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We detected the most proteins on the second day

The third day had few unique proteins, and shared more with second day



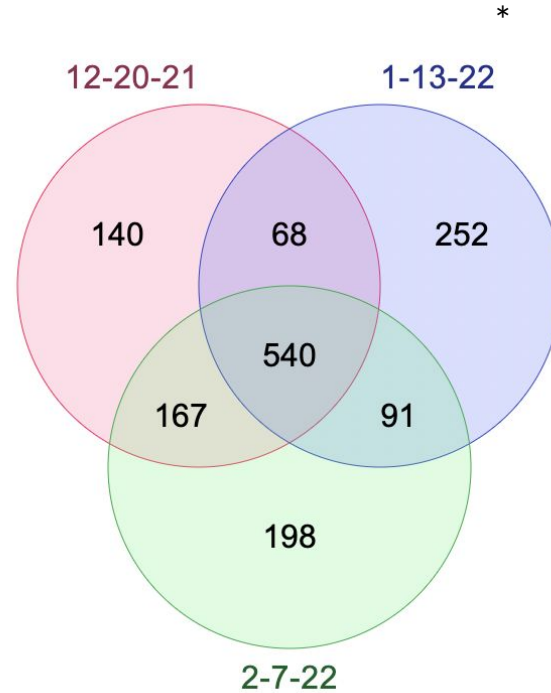
# MAJORITY OF PROTEINS WERE FOUND ACROSS MENSTRUATIONS

**540 PROTEINS WERE  
CONSISTENTLY SEEN  
ACROSS MONTHS**

---

We consistently detected  
~900-1000 proteins

\*post-COVID month had the  
most variation compared to  
other two months



# WHAT DO THE PROTEINS DO IN MENSTRUAL EFFLUENT?

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\*Very preliminary results  
from our study

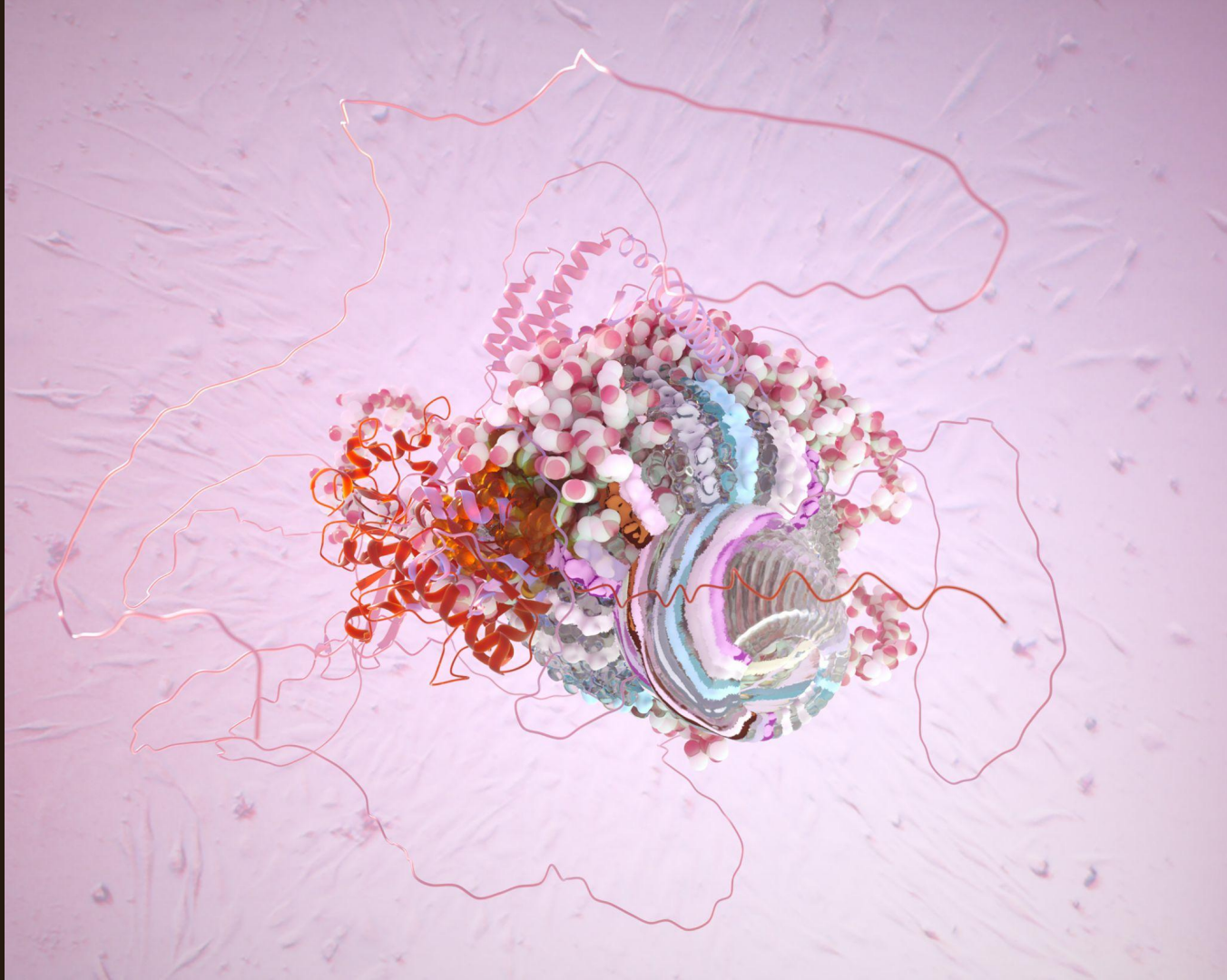
Major related functions:

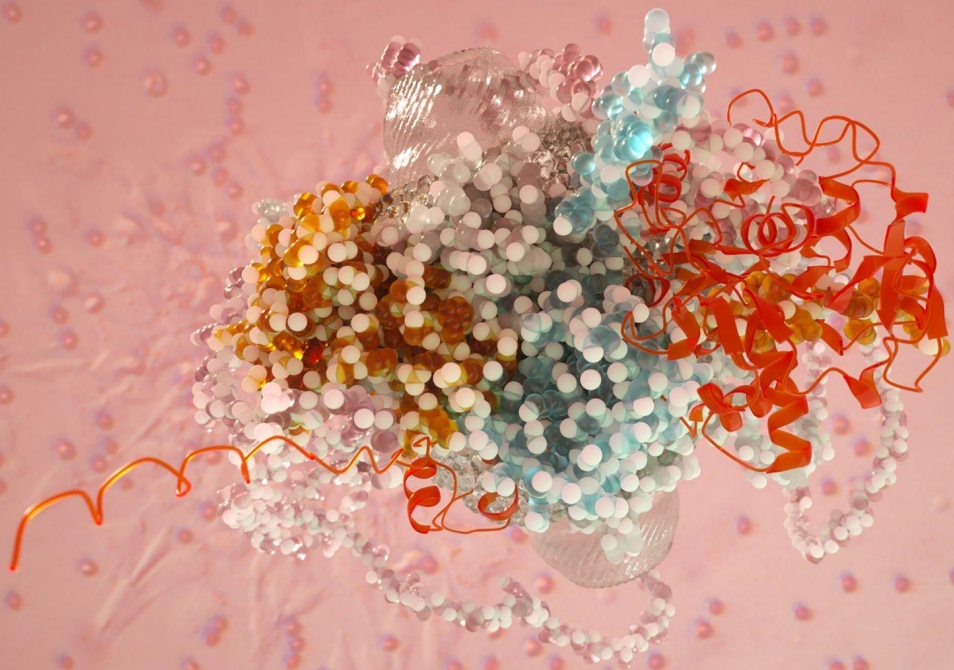
- Hematopoiesis\*
- Apoptosis
- Cell proliferation/migration
- Reproduction

PLUS!

- Defense against infection
- Epithelial-mesenchymal transition
- Retinoid and other signaling
- Bacterial-derived components





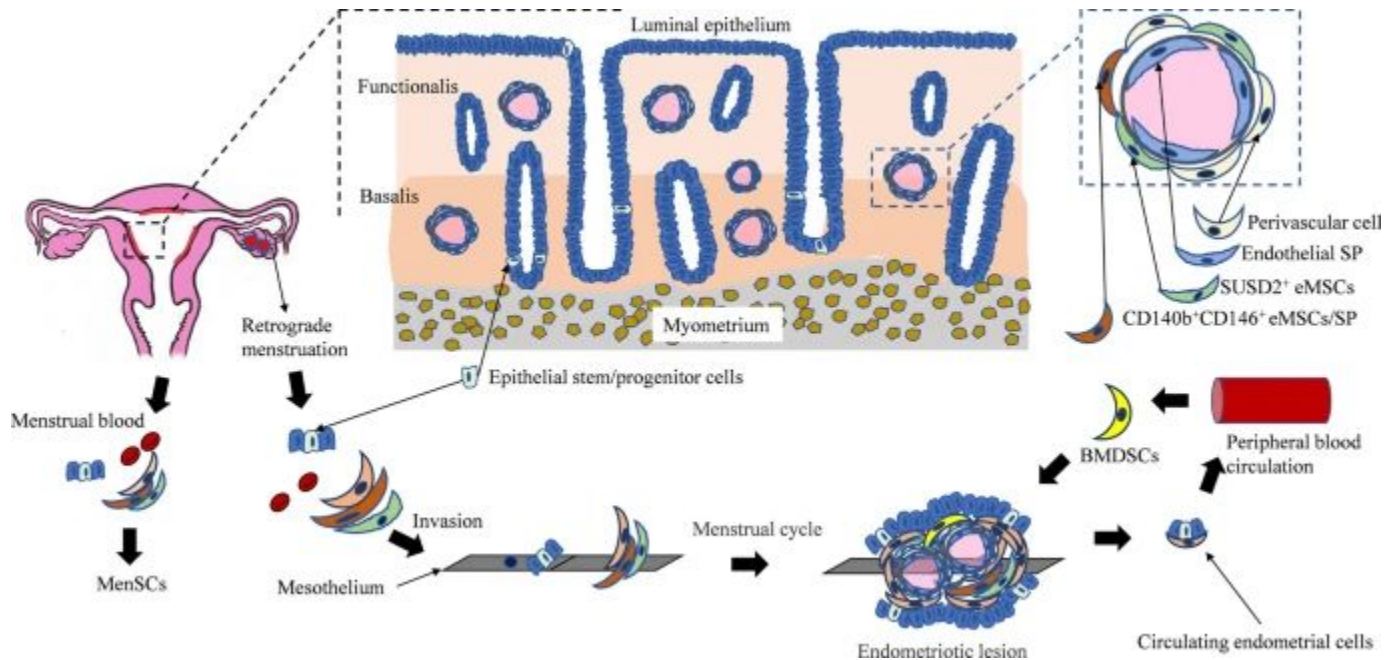


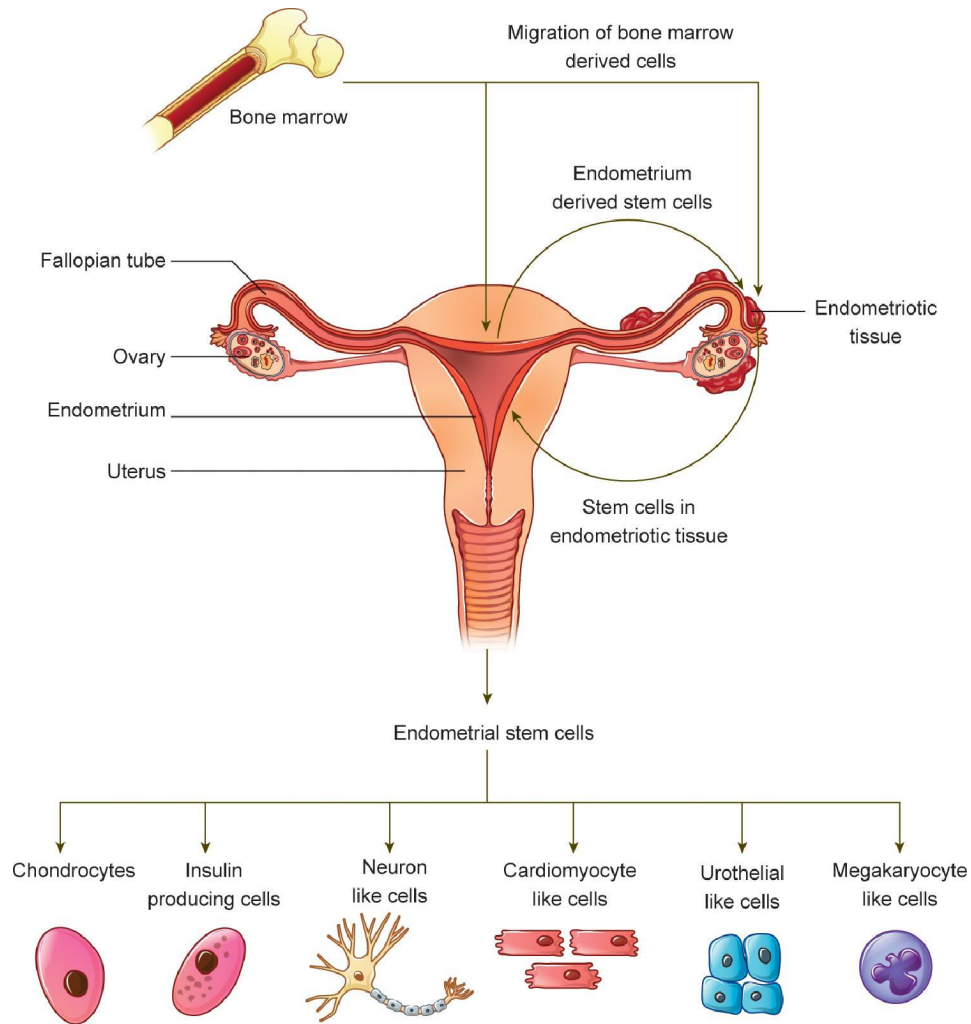




# WHAT ABOUT THE CELLS IN MENSTRUAL EFFLUENT?

Stem cells!

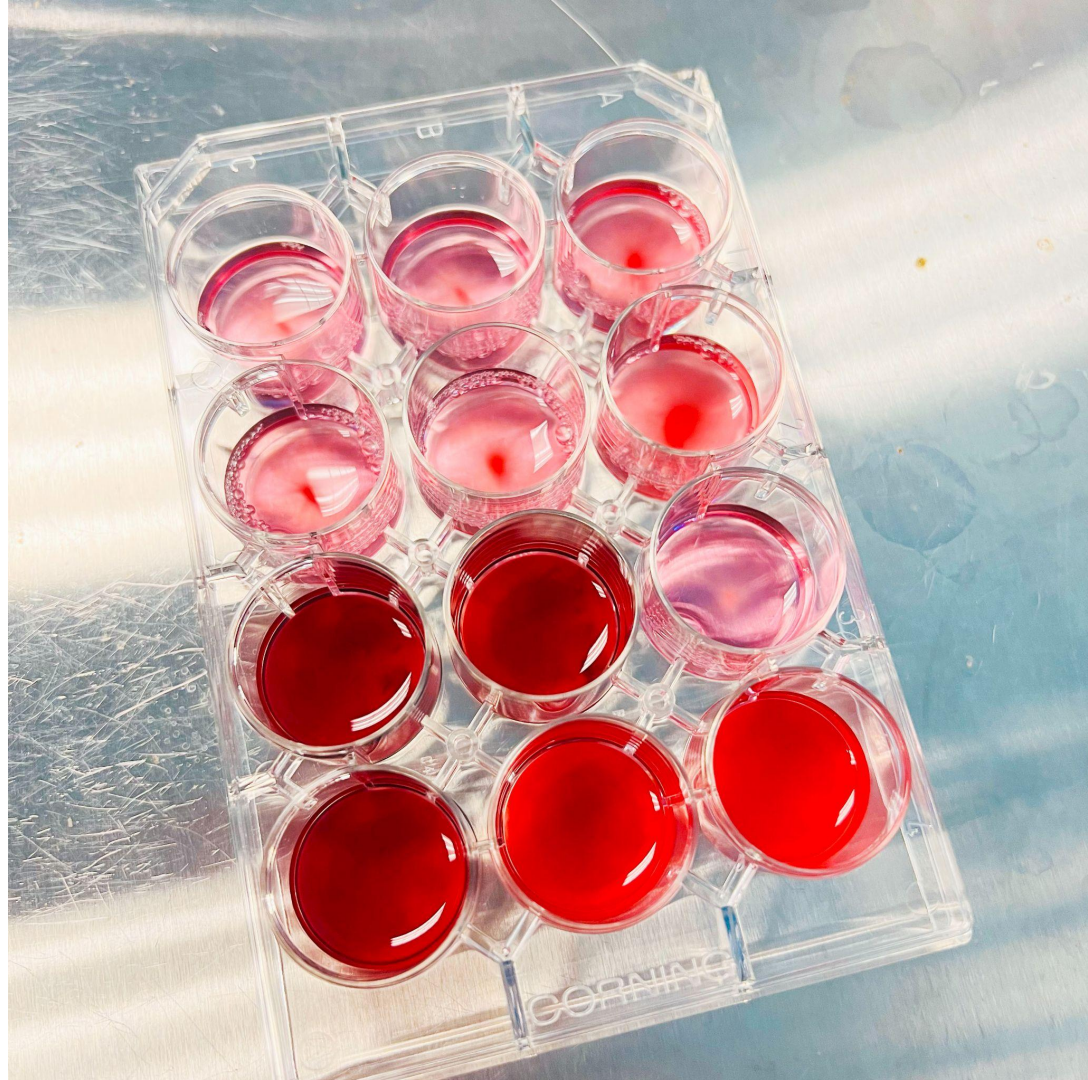




# STEP I PREPARE MEDIA & WELL PLATES



**STEP 2**  
**ADD SAMPLE**





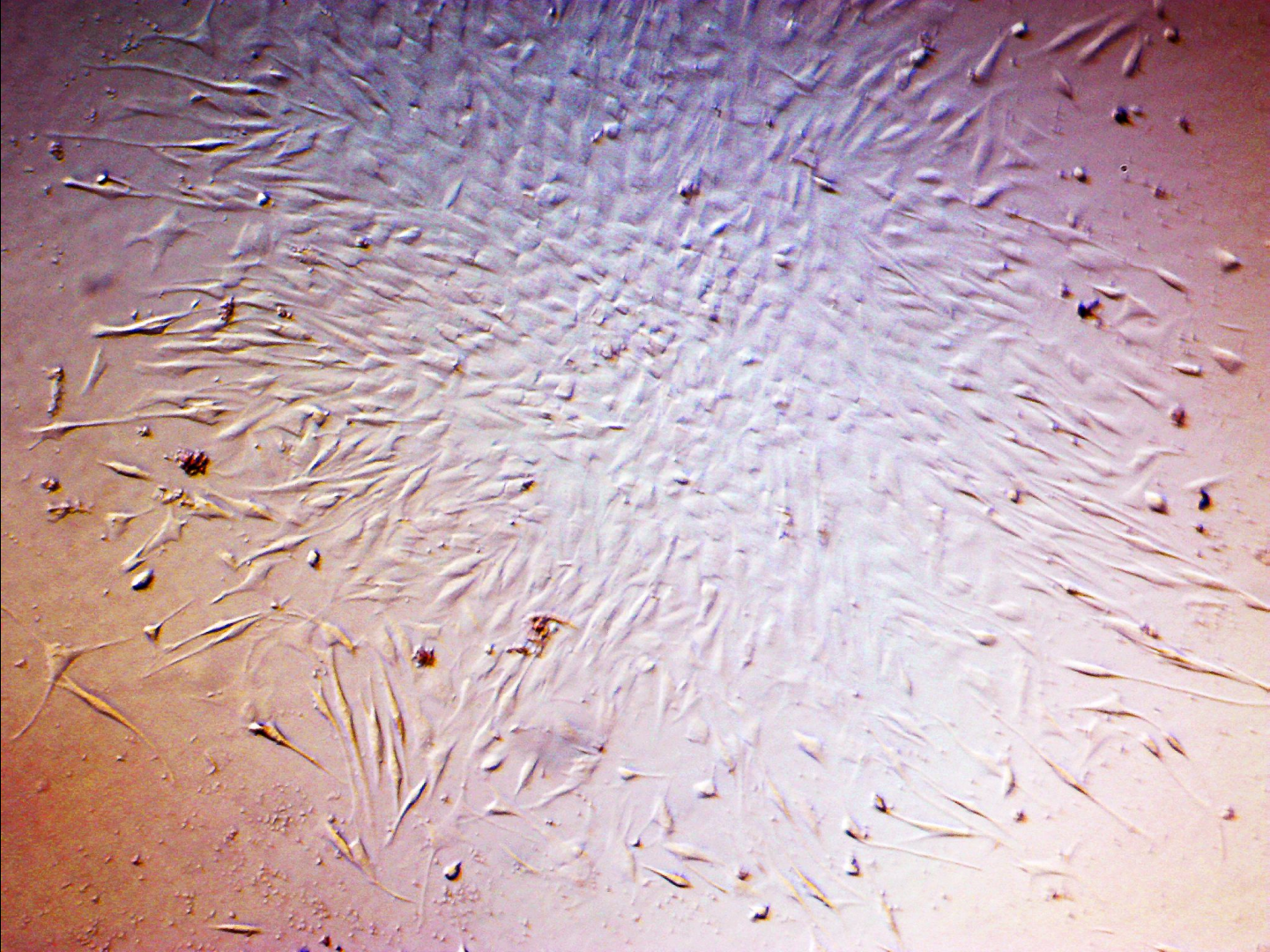
**STEP 3**  
**PLACE BACK TO**  
**INCUBATOR**

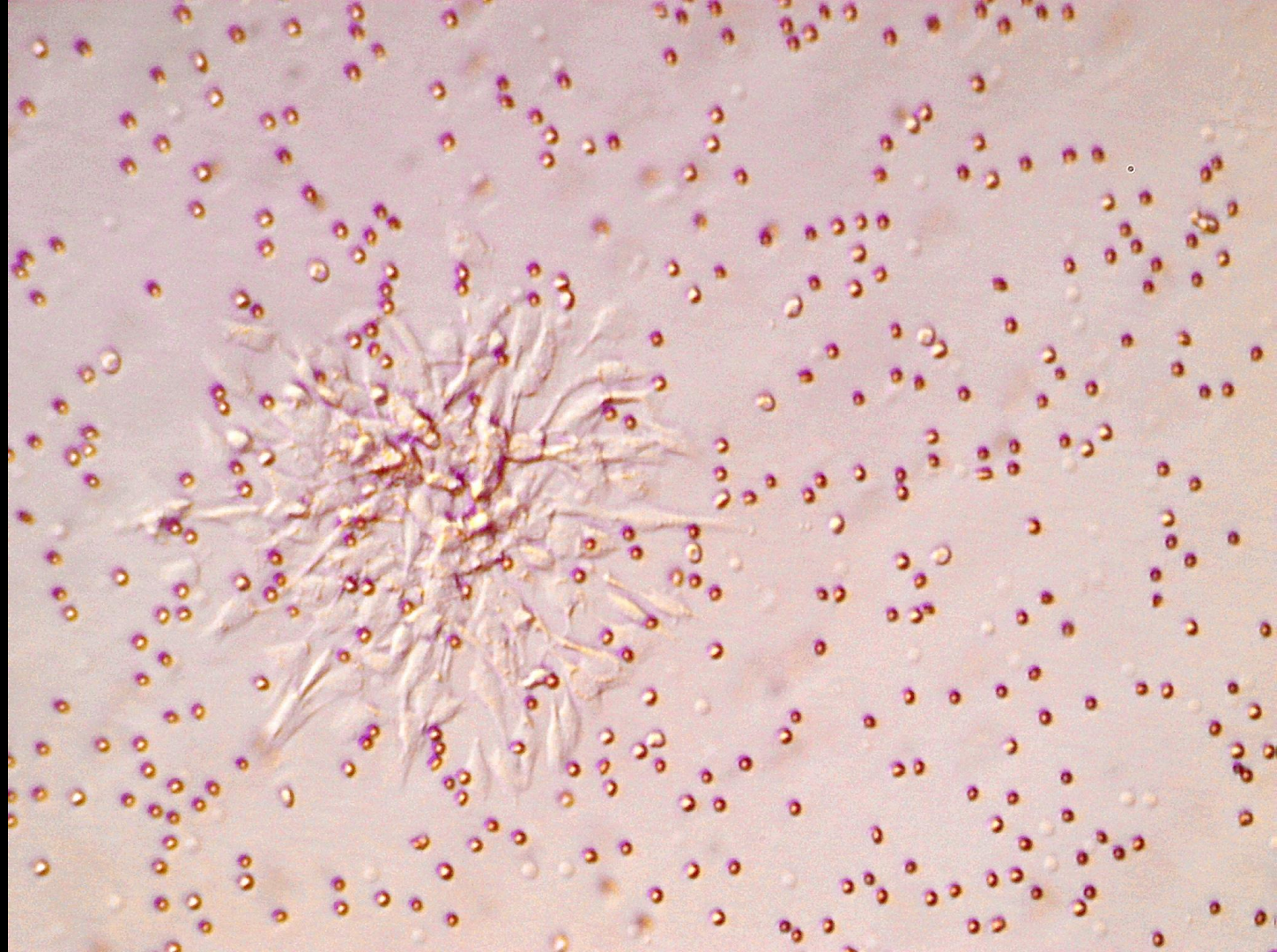


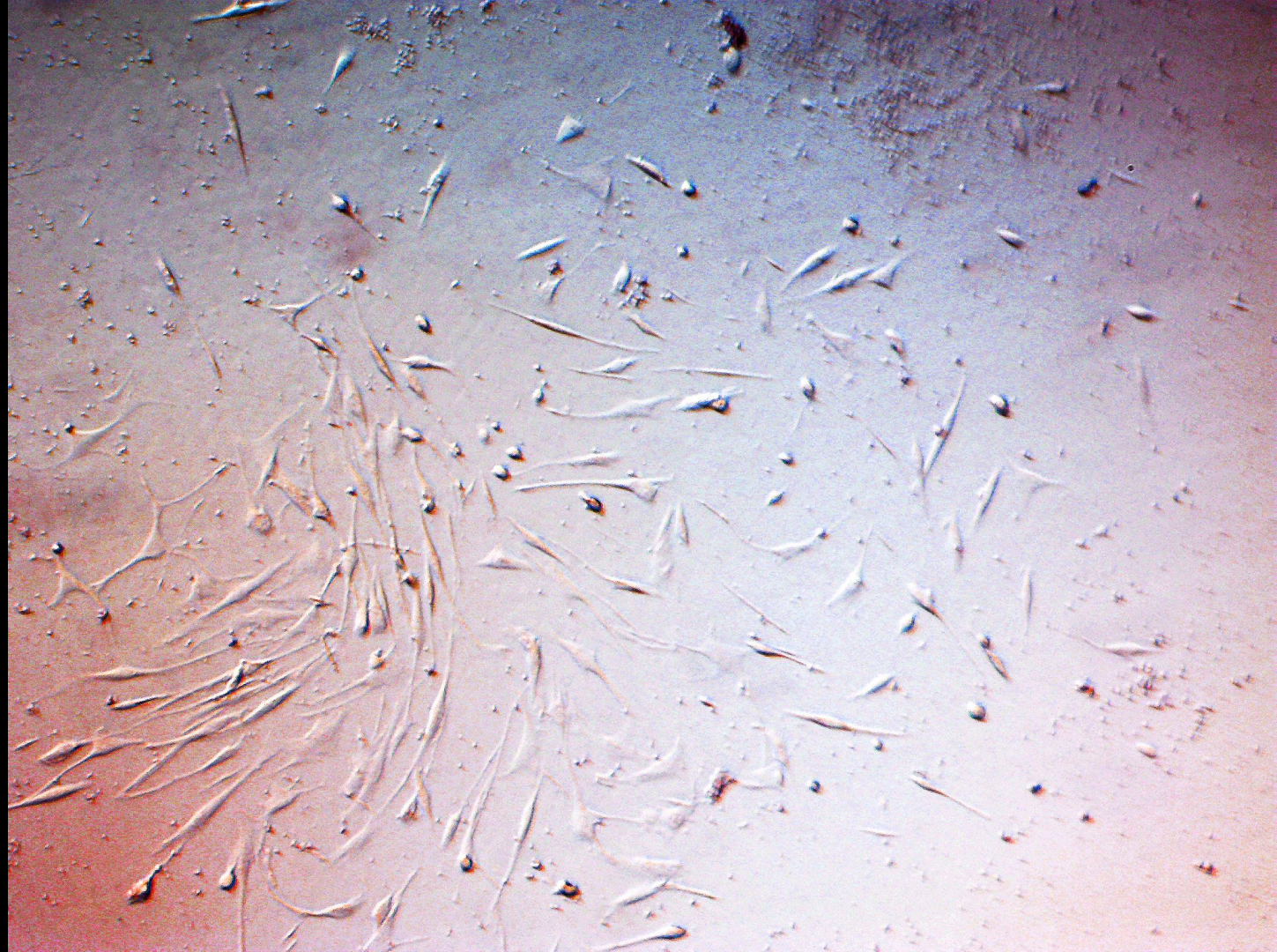
# STEP 4 WASH CELLS

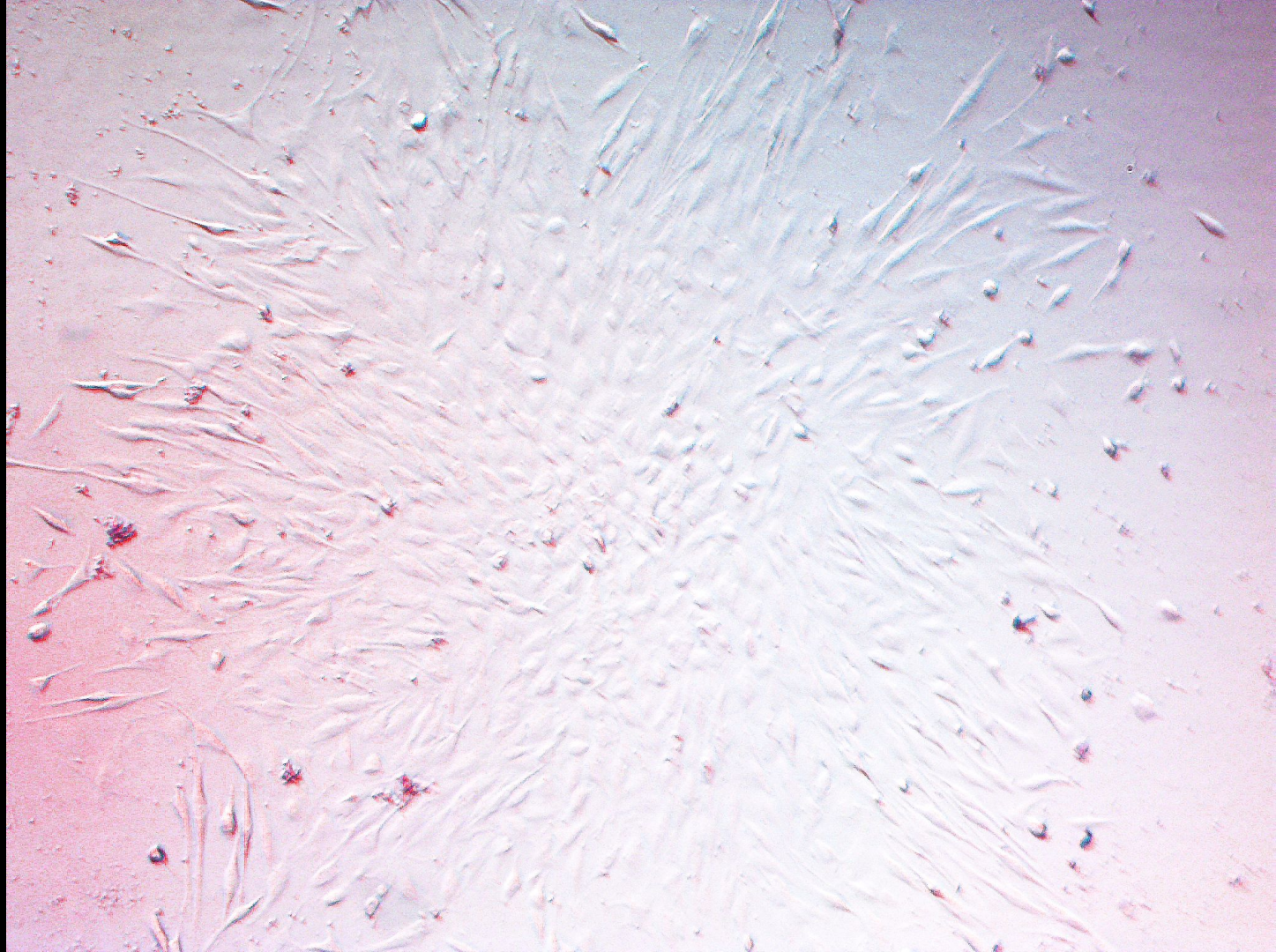


















**BLOODY MARY**

**TOMATO JUICE**

**ELDEST AUNT**

**THE CARROTS ARE COOKED**

**STRAWBERRY WEEK**

**CODE RED ALARM**

**RED TEA**

**THE RED PLAGUE**

**APPLE BREAD**

**SMELLS LIKE FISH**

**KETCHUP WEEK**

**THE BRITISH ARMY LANDED IN MY PANTY.**

**BEETROOT-VAGINA**

**DEFROSTING THE STEAK**