Using Plasmapheresis As An Approach to Cancer Care

“TPE: Therapeutic Plasma Exchange”

Dr. Ahvie Herskowitz

ACAM_FALL 2025

Today's Hidden Health Crisis

Reported by National Institute of Health

Environmental pollutants and human health

- Environmental toxicant exposure is the **leading cause** of chronic disease and premature death globally.



Cancer is a Preventable Disease

- More than **1 million Americans** and more than **10 million people worldwide** are expected to be diagnosed with cancer, this year!

Only **5-10%** of all cancer cases can be attributed to **genetic defects**...

whereas the remaining **90-95%** have their roots in the **environment and lifestyle.**

Savage_AAMP 2025. MDLIFESPAN. https://pmc.ncbi.nlm.nih.gov/articles/PMC2515569/

NIH NATIONAL CANCER INSTITUTE

Today's Hidden Health Crisis

Cancer in young adults

- Recent studies indicate an increase in cancer incidence among younger adults, particularly those under 50.
- While overall cancer death rates have not significantly increased, the rise in diagnoses is prompting investigations into potential causes and risk factors.



The Many Forms of Toxins



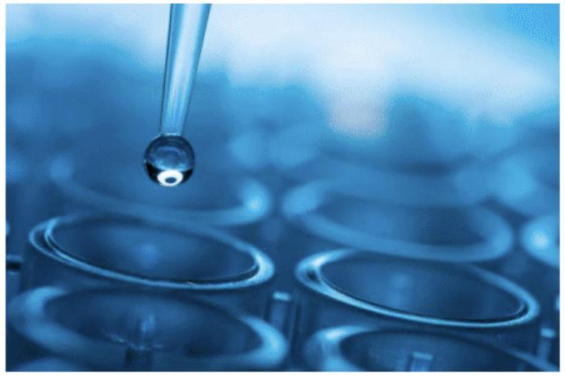
Microplastics



Mycotoxins (Mold)



Toxic Metals



PFAs/PCBs



BPA/Phthalates



Pesticides/Herbicides







Toxins Are Everywhere

- Microplastics in blood & tissues
- Heavy metals & PFAS from everyday products
- Pesticides in food supply
- Toxins are everywhere and in everything

There’s a spoonful of plastic in our brains



- Humans inhale roughly 7,000 microplastics per day.
- Brain samples have 7-30x more plastic than those from the liver or kidneys.
- Cardiovascular patients with microplastics in their blood are 4x likelier to experience heart attack, stroke or death.
- Microplastics are suspected of links to colon cancer and certain lung cancers.

- New York Magazine, Feb 25, 2025

Toxins

People are the direct causes of toxins:

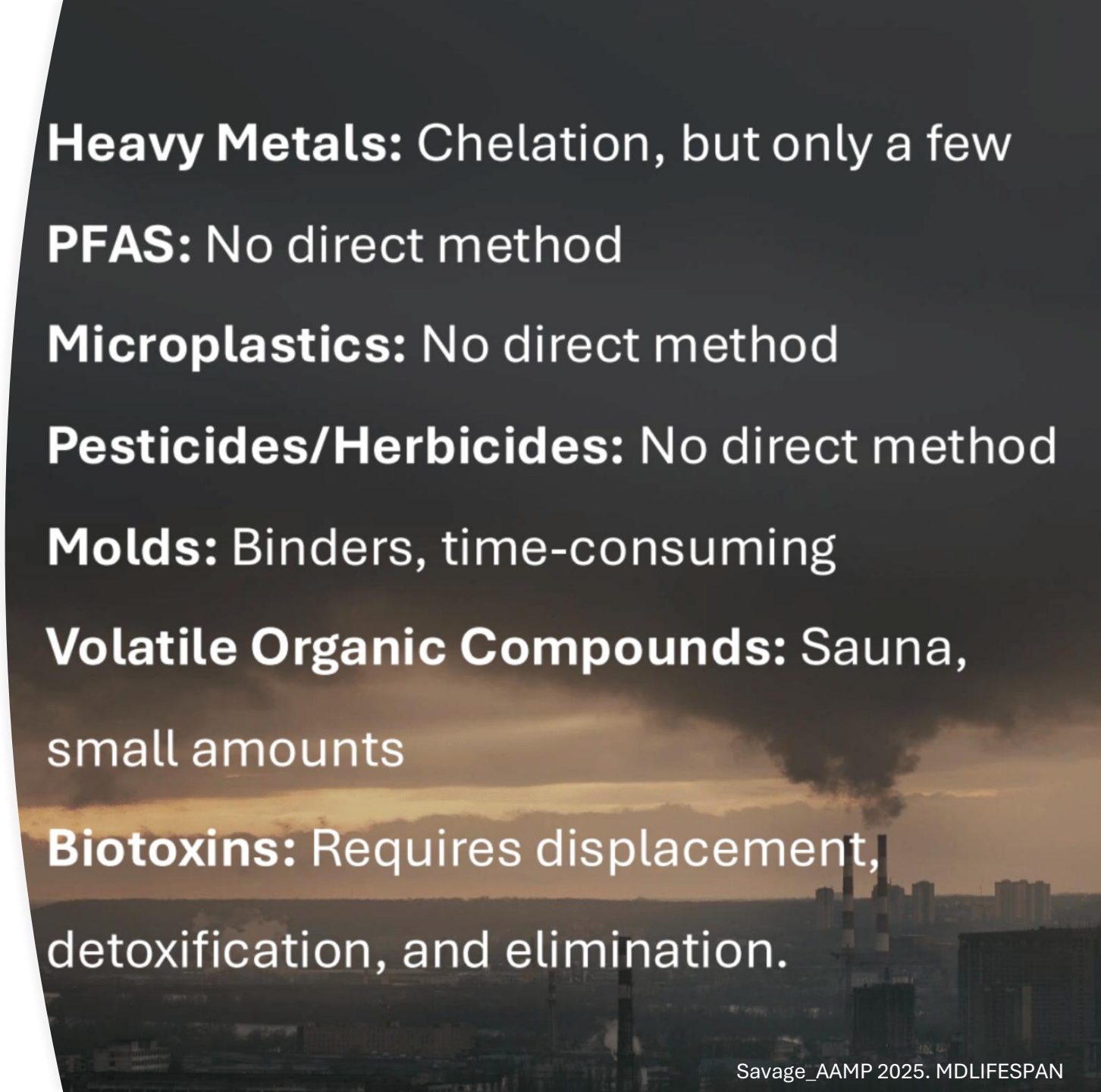
1. Pesticides /herbicides on crops
2. Mycotoxins in cereals and grains
3. Fossil fuel consumption (CO_2)
4. Unearthing heavy metals
5. Industrial chemical boom
6. The unfettered use of plastics

It's estimated that over ***200 diseases*** can be attributed to toxin exposure, ranging from ***cancer to cardiovascular and neurological diseases***.

Source: Healthandenvironment.org

"Toxins are notoriously difficult, and incredibly slow, to get out of the body."

-Dr. Paul Anderson



Potential for Global Impact on Late-Stage Cancer

- Heat
- Targeted “vaccines”
- Therapeutic Apheresis
- Lasers/HIFU

- Lifestyle, gut biome, etc

Anatara Cancer Care Tools

- Laser
- IPT
- All Forms of IV therapies
- GcMAF
- Stellate Ganglion Block
- Lifestyle, Nutritional Guidance and Detox
- SOT
- Cancer Vaccine

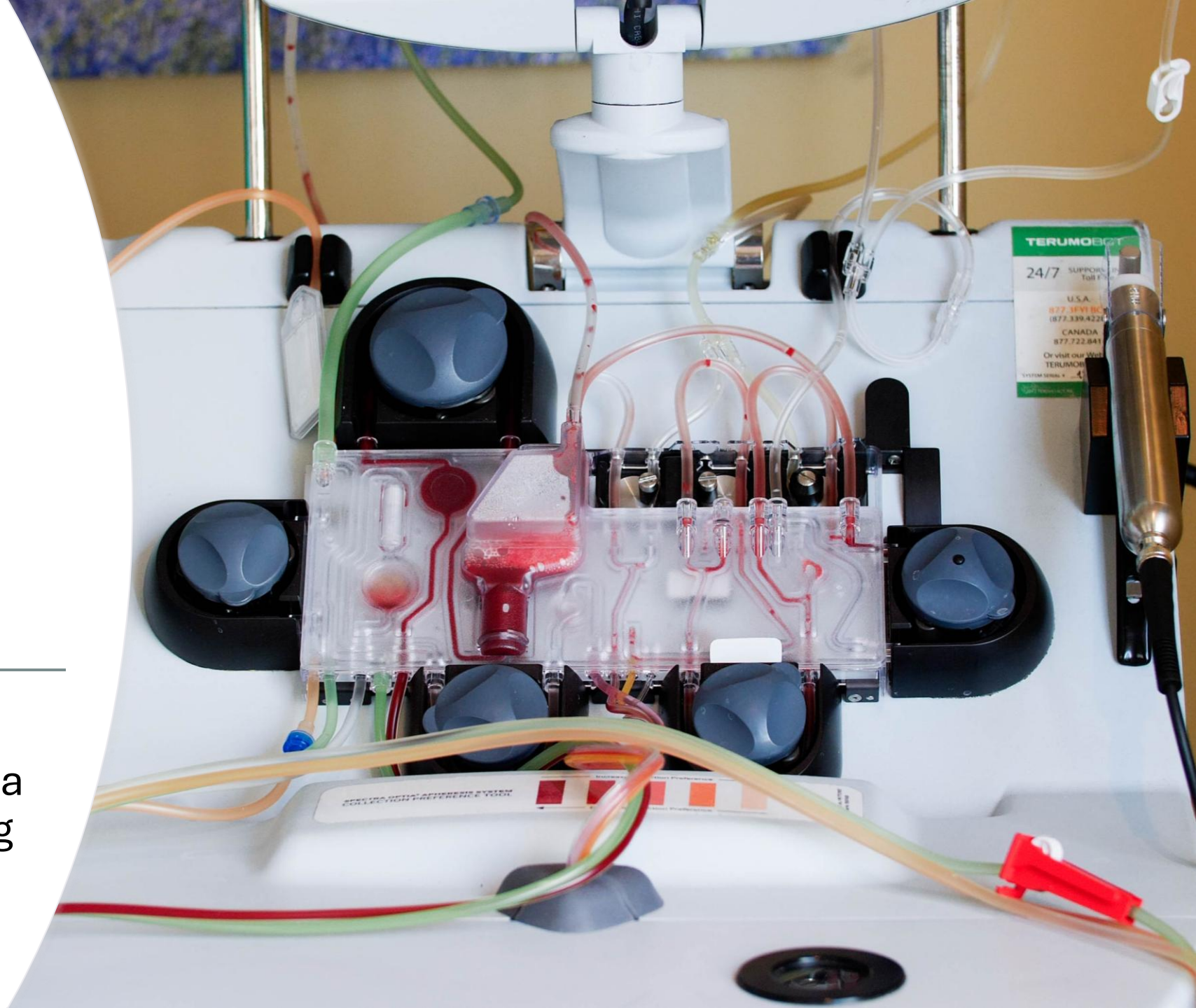
Bloodletting and Plasmapheresis



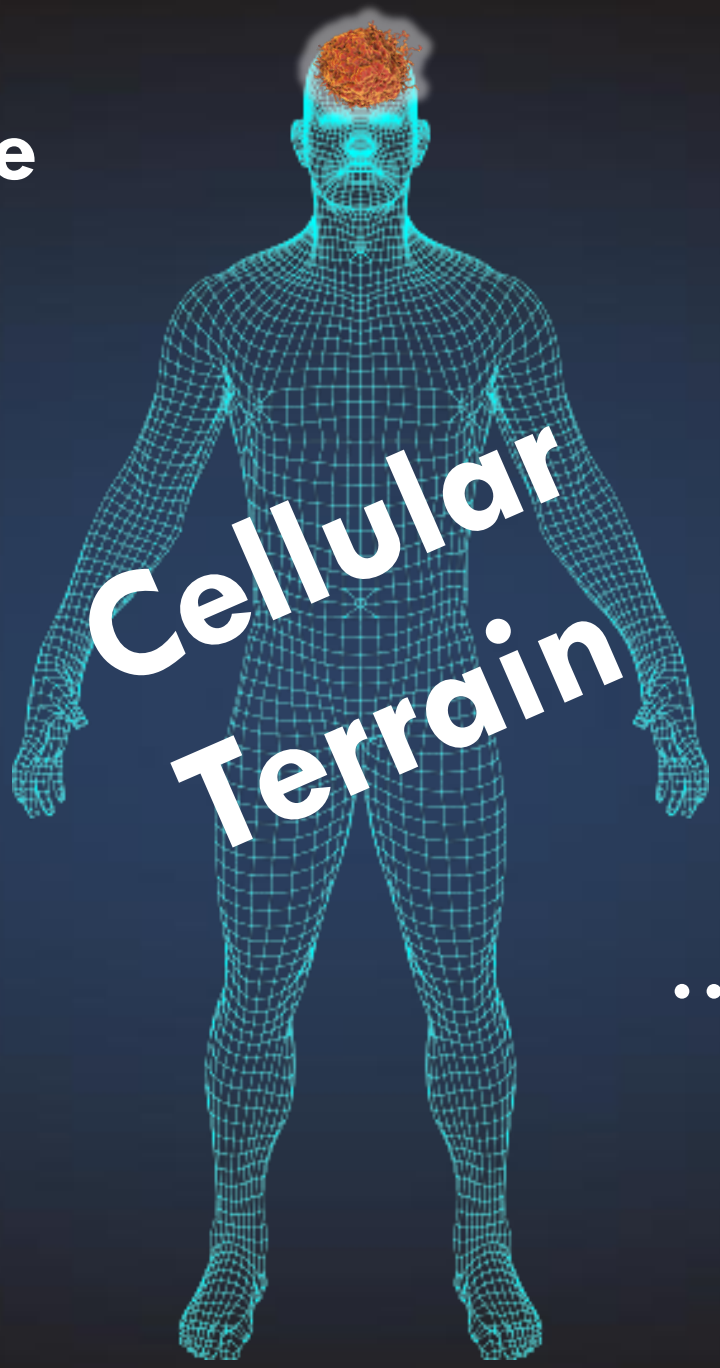


Therapeutic Plasma Exchange

Hypothesis – Can rapid detoxification of the plasma block proliferative signaling in the tumor microenvironment?



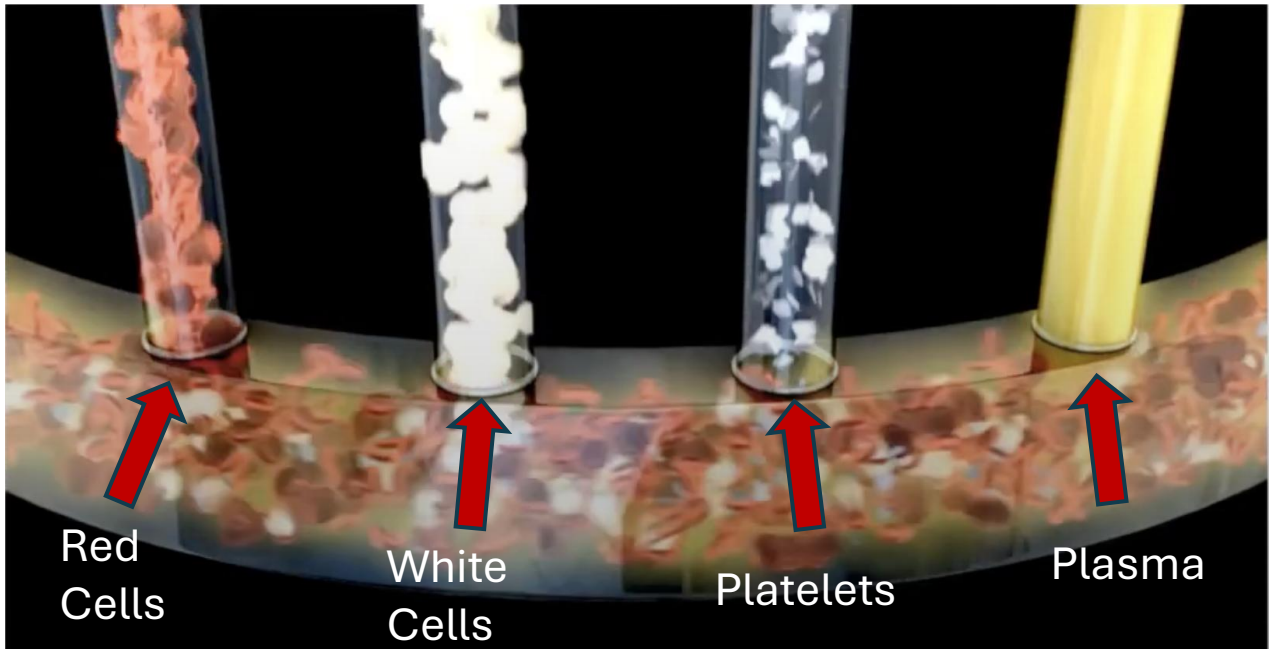
Not so much about the individual organs in the person …



… but more about the person with the individual organs

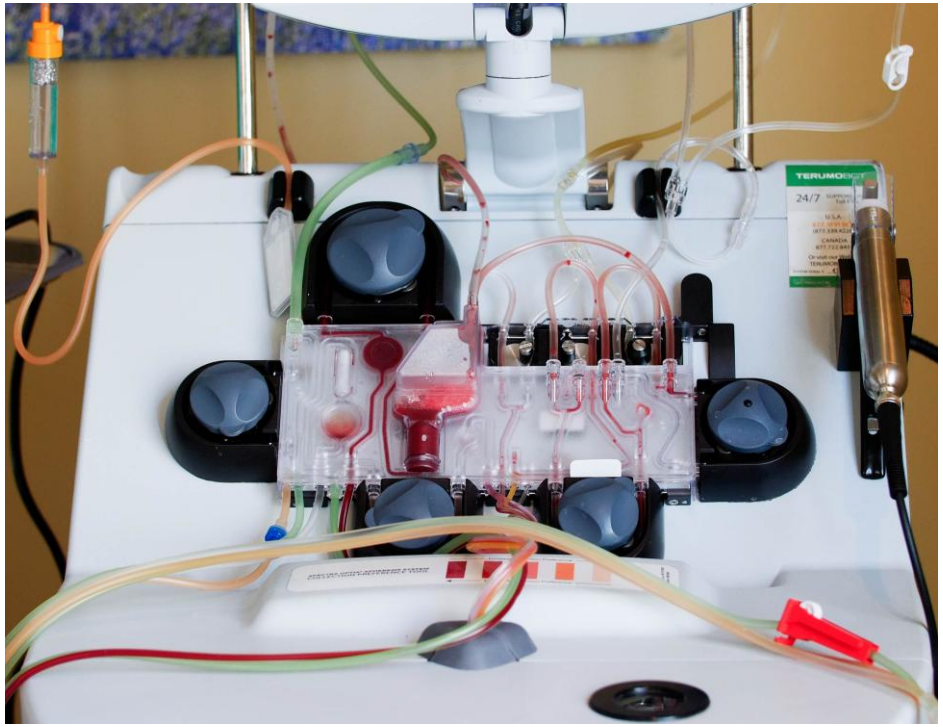
Apheresis – What is it?

- Therapeutic Plasma Exchange (TPE/Plasmapheresis)
  - Removal of plasma from whole blood and placement with a physiologic fluid

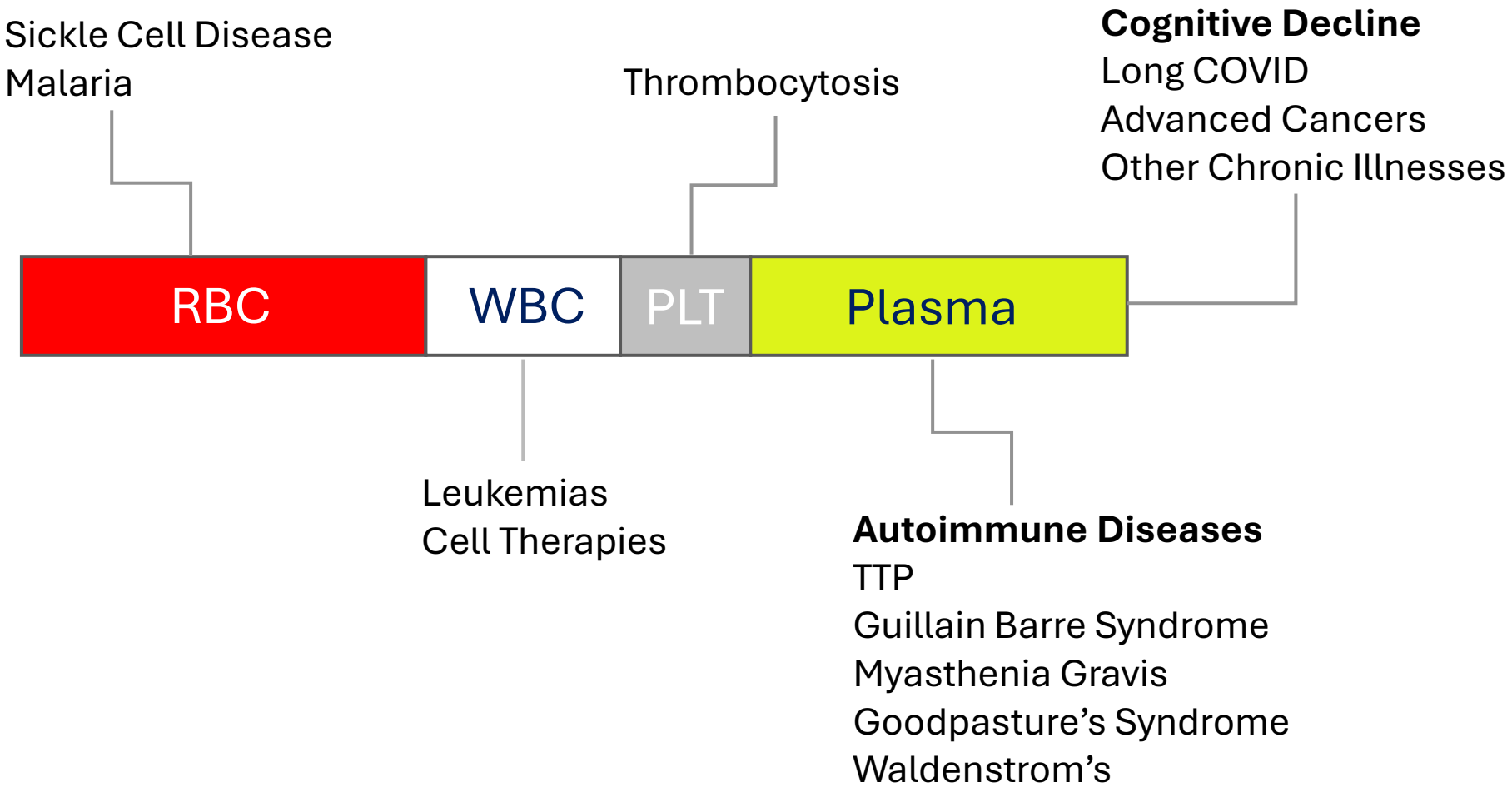


Therapeutic Plasma Exchange (TPE/Plasmapheresis)





Apheresis in Clinical Practice



How much?

- Volume of exchange
  - 1-1.5 plasma volume
    - Calculation depends on numerous factors
  - Frequency of procedures
  - Duration of therapy

Exchange Fluids

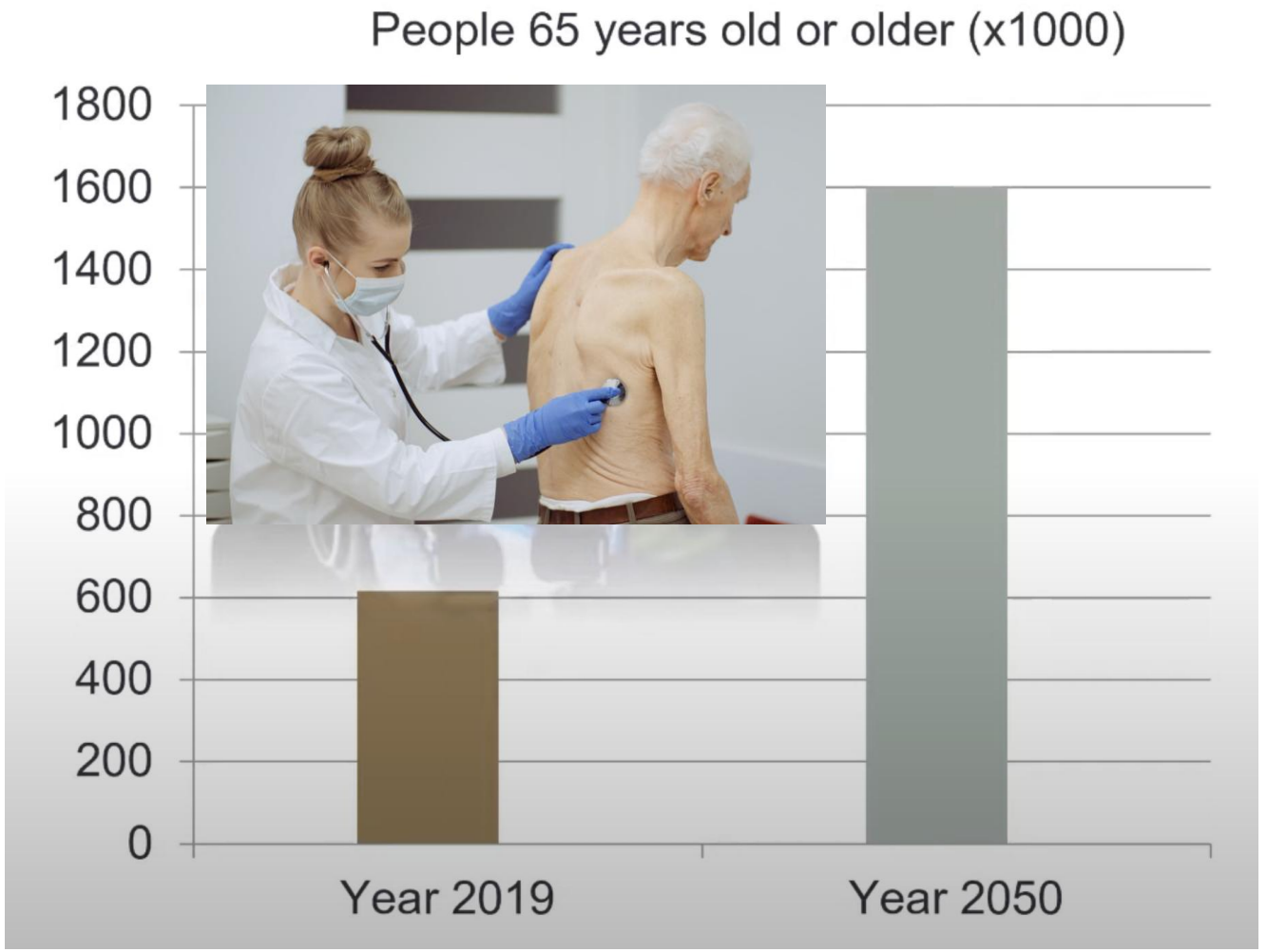
- 5% Albumin
  - Best choice
  - Dilute only with saline
- Combination of saline and albumin
- FFP
- Cryopoor plasma

USA is living longer but sicker

- In 2030, 1 in 5 Americans will be 65 or older
- By 2050 2 billion people on earth will be older than 60-65

JAMA, Mar11, 2013;173:385-386

"Despite their longer life expectancy over previous generations, U.S baby boomers have higher rates of chronic diseases"



https://www.americashealthrankings.org/

Terrain

- Mold/Fungi
- Heavy Metals
- Pesticides/Forever Chemicals
- Microplastics
- Lyme/coinfections
- Viruses/parasites

- Spike proteins
- Oncogenes
- SASP’s
- Cell Danger Signaling Molecules
- pH, Hypoxic zones, Lymphatic & Vascular obstruction

Terrain

Autoimmune Disease

- Presence of autoantibodies
  - Antibodies that attack self tissues
    - Anti-ANA (antinuclear antibodies)
    - Antiphospholipid antibodies (anticardiolipin antibodies)
    - Post-viral autoimmunity – e.g., COVID, Myocarditis
- Presence of Pro-inflammatory, Metabolic and Pro-thrombotic factors
  - Fibrinogen
  - IL 6
  - TNF alpha
  - CRP, Ferritin

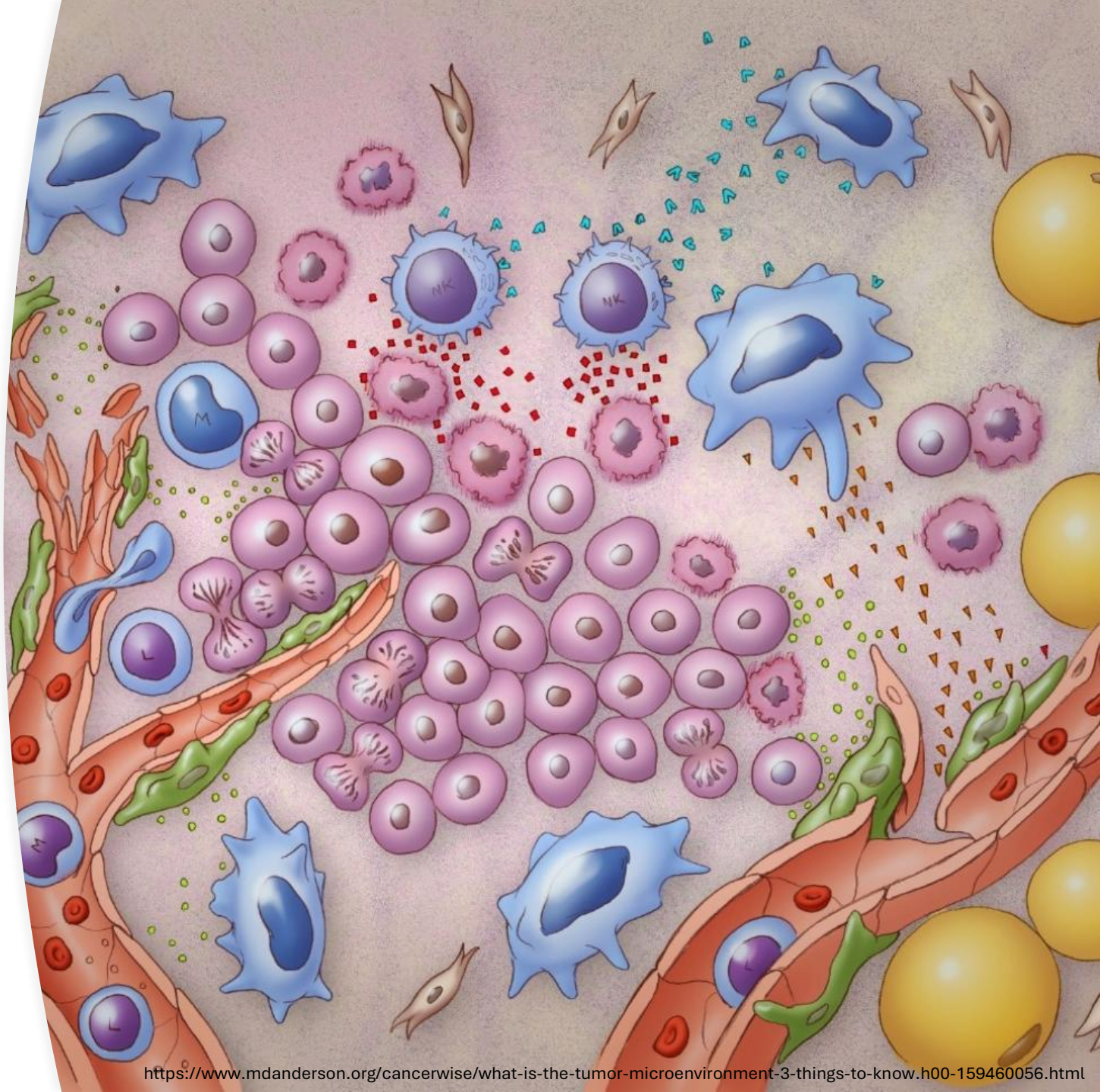
Older People

- Presence of Pro-oncogenic factors
- Metabolic Syndrome
- Depressed Mitochondrial Function
- Increased Protein Folding

What's in the Plasma?

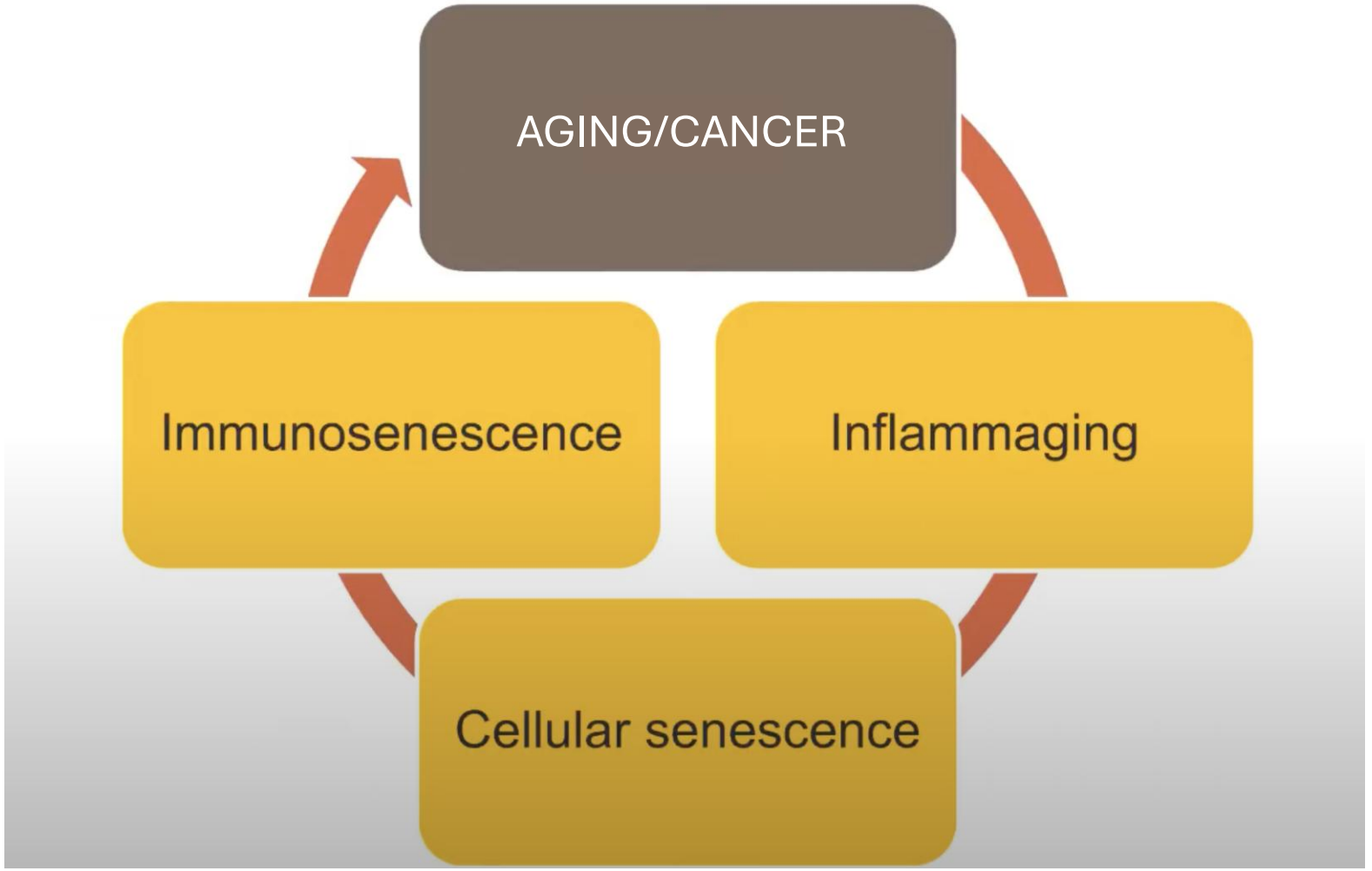
- Oncogenes
- Pro-inflammatory Cytokines
- Chemokines
- SASPs
- Heavy Metals
- Mold
- Spike Protein
- Fungi
- Viruses

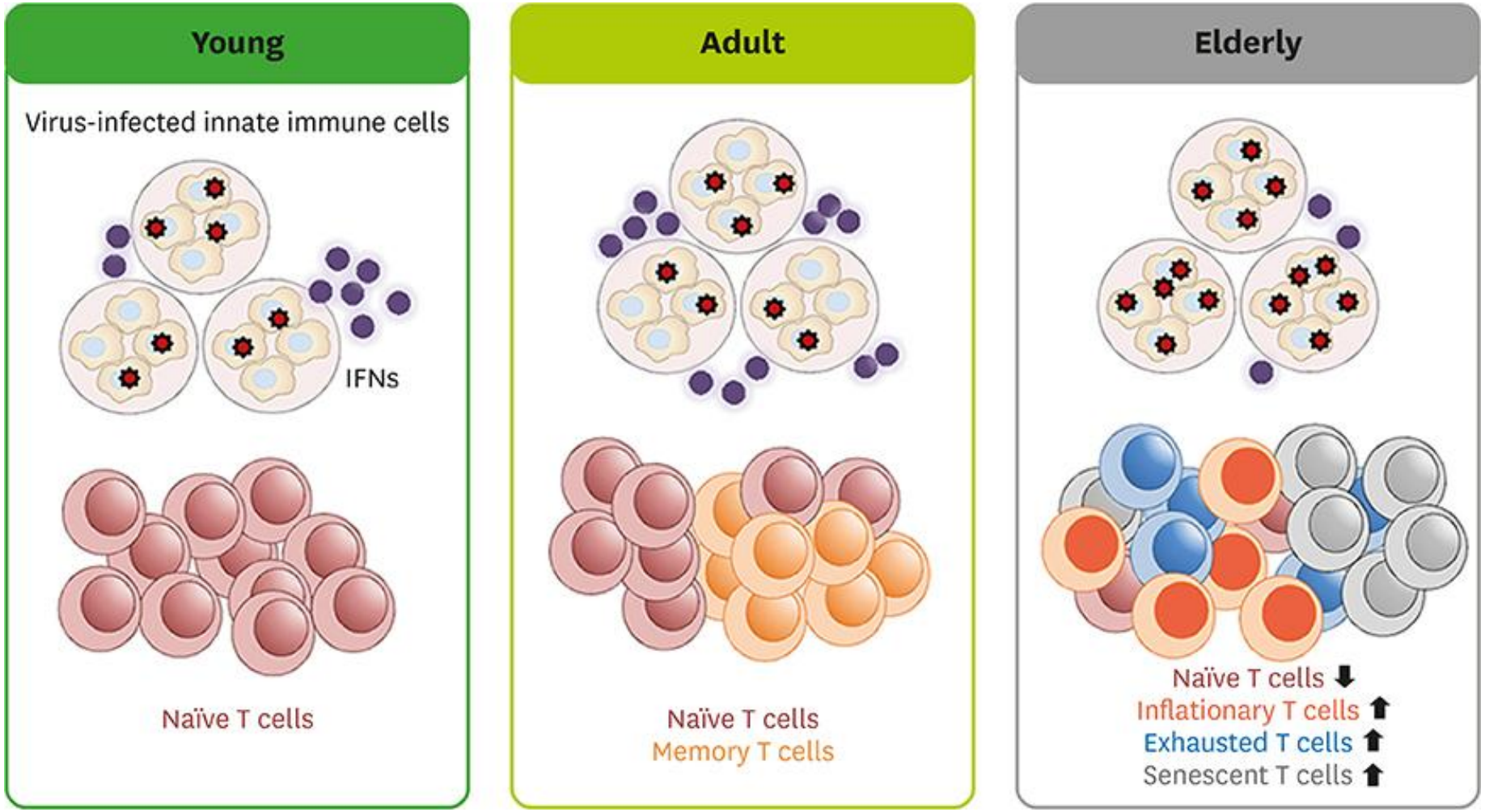
All these lead to sustained mitochondrial injury, overwhelming natural repair mechanisms and promoting tumor production and progression



https://www.mdanderson.org/cancerwise/what-is-the-tumor-microenvironment-3-things-to-know.h00-159460056.html

Overwhelmed Immune System

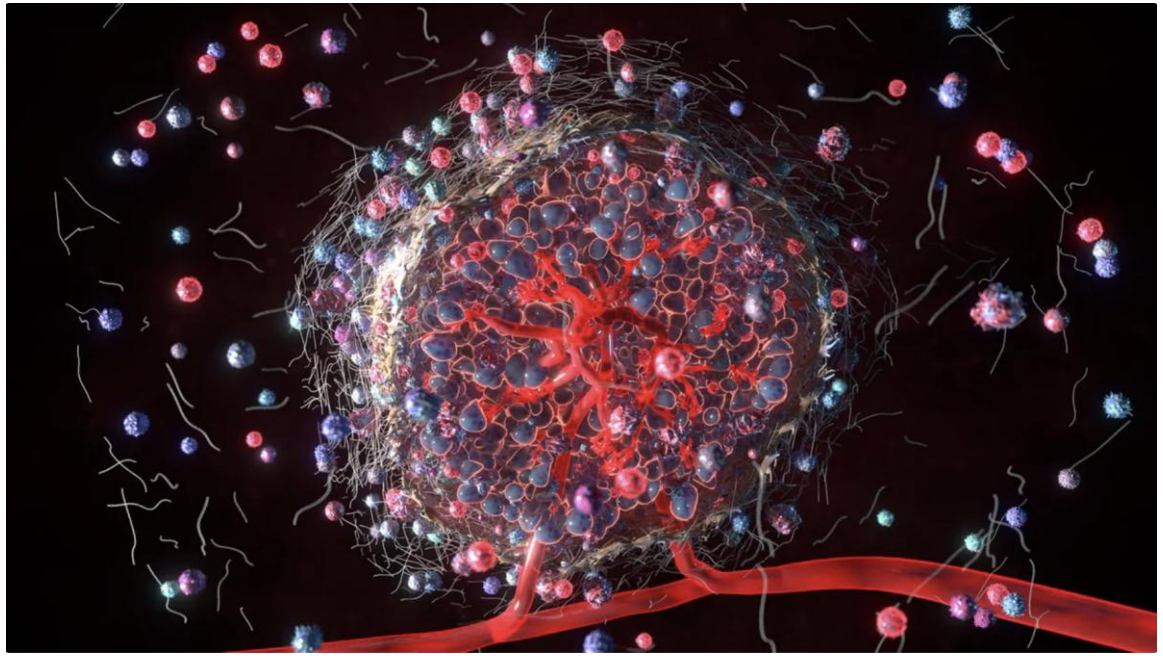



Young
Virus-infected innate immune cells
IFNs
Naïve T cells
Adult
Naïve T cells
Memory T cells
Elderly
Naïve T cells ⬇
Inflationary T cells ⬆
Exhausted T cells ⬆
Senescent T cells ⬆

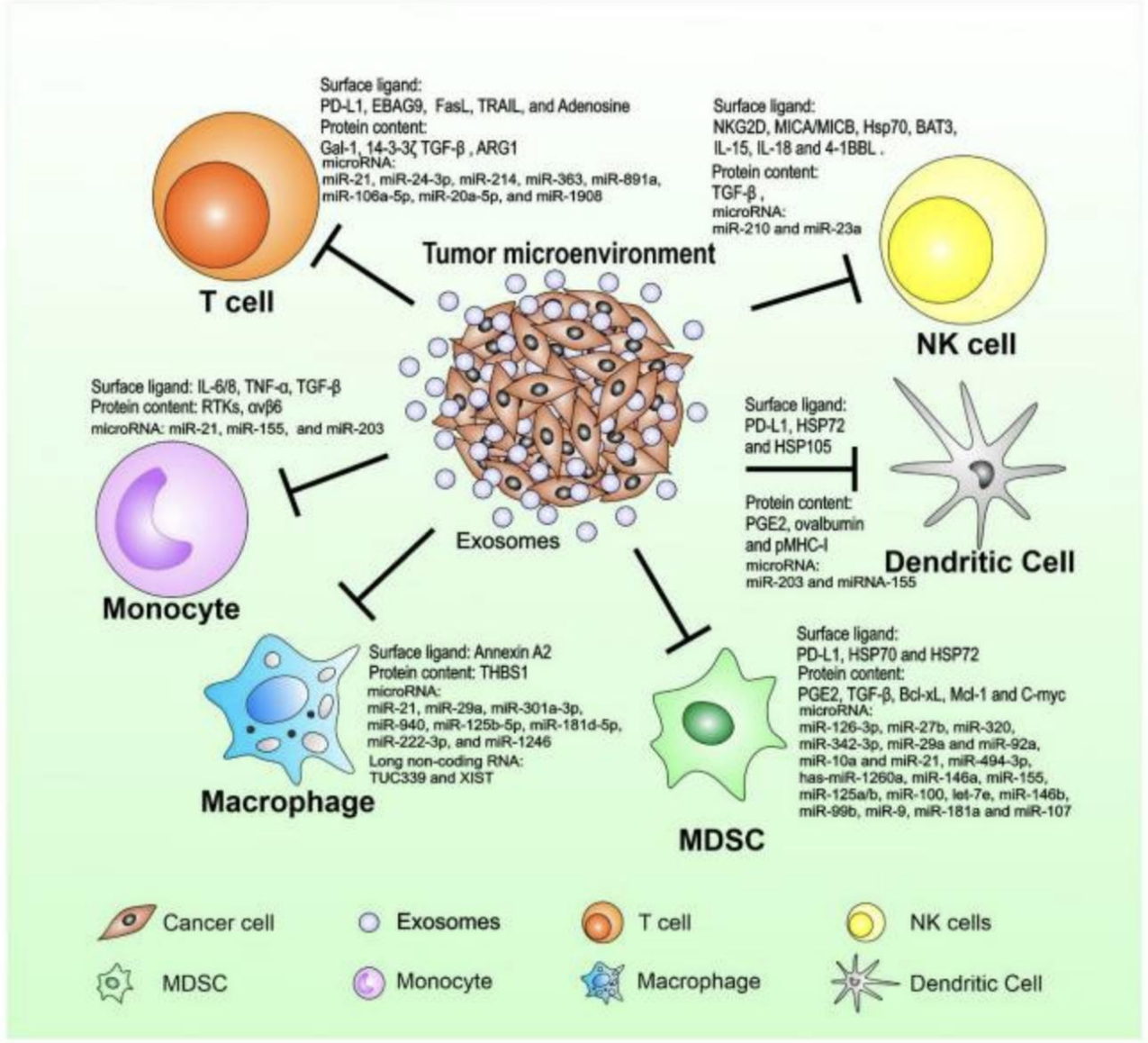
Tumor Microenvironment

Cancer cells don’t exist in isolation, they live within a complex ecosystem

- Immune Cells
- Stromal Cells
- Extracellular Matrix
- Blood Vessels
- Plasma Proteins



https://www.technologynetworks.com/cancer-research/articles/interrogating-the-complexities-of-the-tumor-microenvironment-367923



Hao Q, Wu Y, Wu Y, Wang P, Vadgama JV. Tumor-Derived Exosomes in Tumor-Induced Immune Suppression. Int J Mol Sci. 2022 Jan 27;23(3):1461. doi: 10.3390/ijms23031461. PMID: 35163380; PMCID: PMC8836190.

The pH of the Immediate Tumor Microenvironment

- Most solid tumors develop an acidic extracellular microenvironment
    - This is driven primarily by the **Warburg effect** (aerobic glycolysis), where tumor cells preferentially convert glucose to lactate, even in the presence of oxygen.
    - Accumulation of **lactic acid** and poor perfusion → **extracellular pH ~6.4–6.9**, compared to ~7.2–7.4 in normal tissues.
    - **Intracellular pH (pHi)** in tumor cells, paradoxically, tends to be maintained at **neutral-to-alkaline** levels (~7.2–7.6), giving tumor cells a growth/survival advantage while surrounding stromal and immune cells are suppressed.

Extracellular tumor microenvironment = acidic, but **tumor cell cytoplasm = relatively alkaline**

Why Tumor Microenvironment Acidity Matters

- Acidic extracellular pH promotes:
  - **Invasion and metastasis** (acid activates proteases like MMPs, degrades ECM).
  - **Immune evasion** (T cells and NK cells are less effective in acidic niches).
  - **Selection of aggressive clones** that tolerate acidity.

Tumor cells can take advantage of their surrounding microenvironment

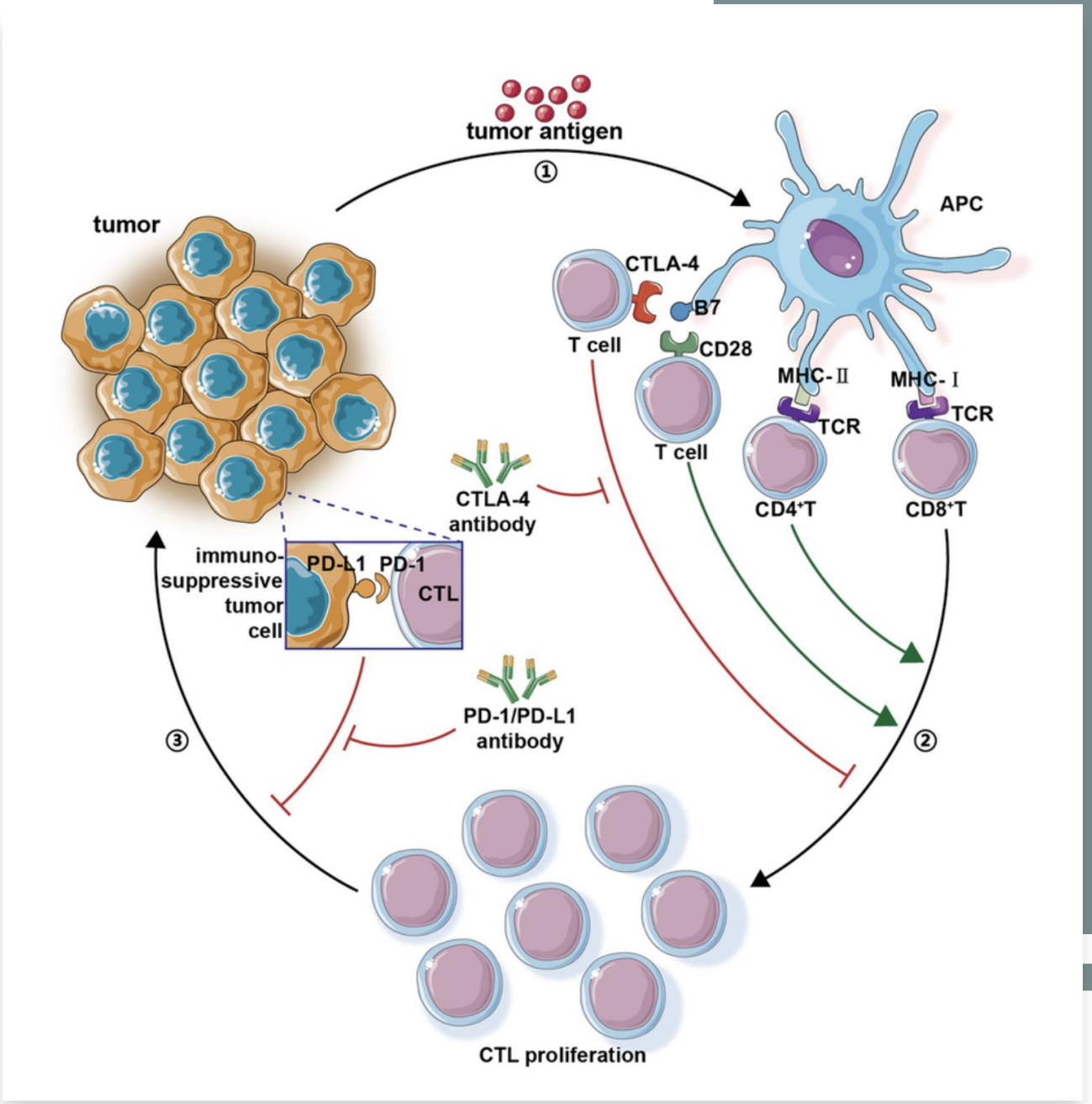
- Co-opt nutrients
- Block immune surveillance and host response

vs

- Curtail tumor growth
- Prevent metastasis

https://www.technologynetworks.com/cancer-research/articles/interrogating-the-complexities-of-the-tumor-microenvironment-367923

PD-L1
(inhibitor of programmed cell death ligand)



https://www.researchgate.net/figure/Schematic-of-the-mechanisms-of-PD-L1-PD-1-and-CTLA-4-inhibitors-The-tumor-antigens_fig1_362382435

nature communications

Article

https://doi.org/10.1038/s41467-025-57865-9

Plasma exchange and radiation resensitize immunotherapy-refractory melanoma: a phase I trial

Open access Original research

Journal for ImmunoTherapy of Cancer

Therapeutic plasma exchange clears circulating soluble PD-L1 and PD-L1-positive extracellular vesicles

Jacob J Orme ,[1] Elizabeth Ann L Enninga,[2] Fabrice Lucien-Matteoni,[3] Heather Dale,[4] Edwin Burgstaler,[4] Susan M Harrington,[3] Matthew K Ball,[4] Aaron S Mansfield,[1] Sean S Park,[5] Mathew S Block,[1] Svetomir N Markovic,[1] Yiyi Yan,[1] Haidong Dong,[3] Roxana S Dronca,[6] Jeffrey L Winters[4]

Classes of Molecules Captured in TPE/DFPP Filtrate

Immune Proteins	IgG/IgM, Immune complexes, Complement
Inflammatory Mediators	TNF-α, IL-6, CRP, Pentraxin-3
Immune Checkpoints/EVs	Soluble PD-L1, PD-L1+ EVs
Lipoproteins	LDL, Lp(a), TG-rich particles
Protein-bound Metabolites	Thyroid hormones, Bilirubin, Bile acids
Environmental Pollutants	PFAS (PFOS, PFHxS), Mycotoxins (OTA), Micro-/nanoplastics
Metals	Copper (Wilson’s), Cobalt/Chromium (implants)
Pathogen-Associated Molecules	Endotoxin (LPS)

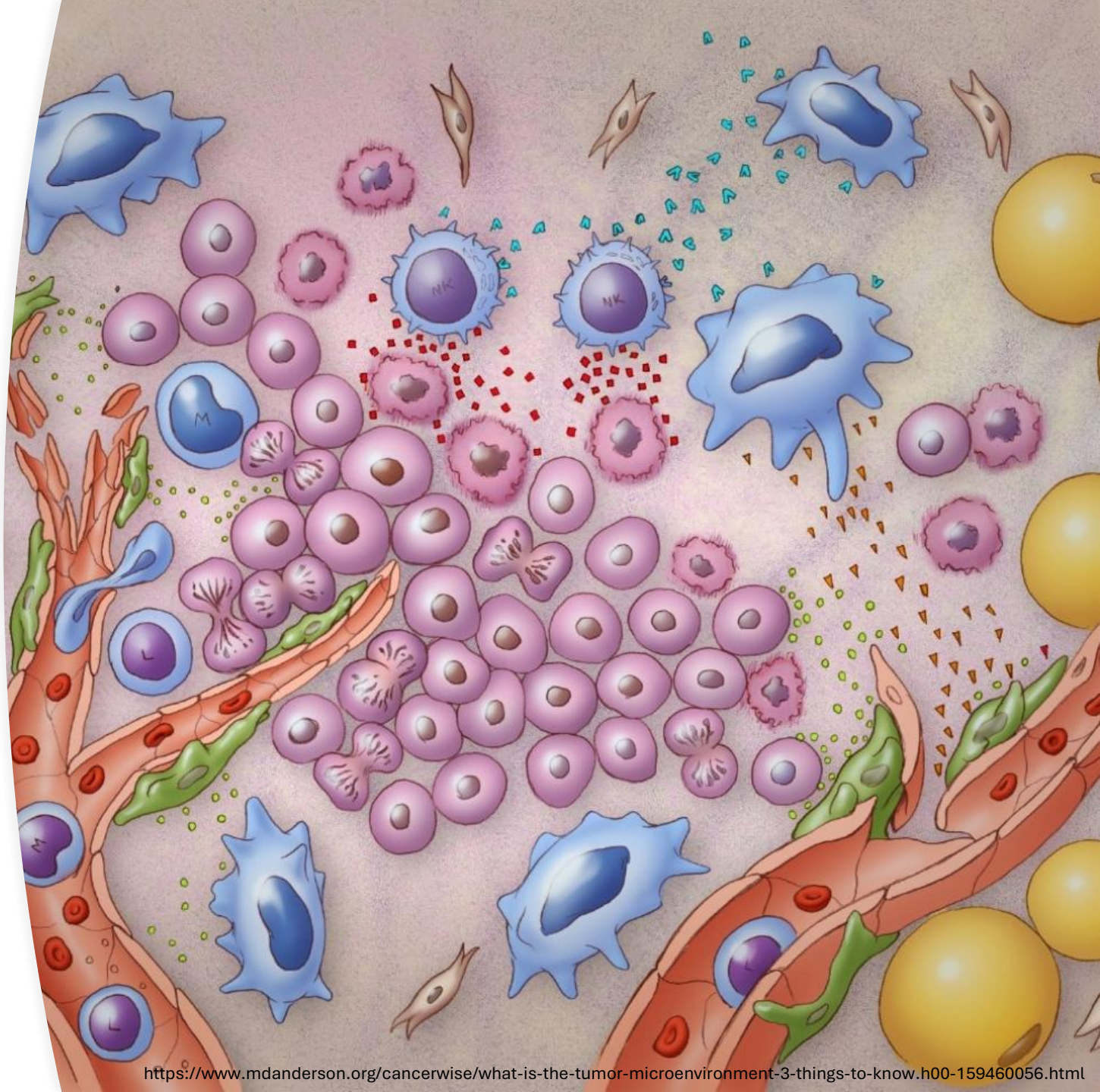
Classes of Molecules Captured in TPE/DFPP Filtrate

Target Class	Typical Size/Binding	Captured by	Evidence Strength
Autoantibodies/Immune Complexes	IgG ~150 kDa; IgM ~970 kDa	TPE, DFPP (strong with DFPP)	High
Cytokines/Acute-phase proteins	10–250 kDa	TPE (transient)	Moderate–High
Soluble PD-L1 & EVs	sPD-L1 40–90 kDa; EVs 30–1000 nm	TPE	Moderate (growing)
Lipoproteins (LDL, Lp(a), TG-rich)	20–60 nm particles	DFPP / Lipoprotein apheresis	High
Protein-bound hormones/metabolites	Albumin-bound (67 kDa carrier)	TPE	High (indication-specific)
PFAS (PFOS/PFHxS)	Protein-bound in plasma	Plasma removal/apheresis	Moderate (RCT with plasma donation)
Mycotoxins (e.g., OTA)	>99% albumin-bound	Likely by TPE (theoretical)	Plausible; limited data
Micro-/Nano-plastics	0.1–1000 µm	Apheresis (preliminary)	Preliminary
Metals (Cu, Co, Cr)	Protein-bound; variable	TPE (temporary); chelation preferred	Indication-specific
Endotoxin (LPS)	~10 kDa; aggregates	PMX hemoperfusion > TPE	Moderate (PMX); limited for TPE

Summary of TPE Removal Targets

What's in the Plasma?

- Oncogenes
- Pro-inflammatory Cytokines
- Chemokines
- SAPS
- Heavy Metals
- Mold
- Spike Protein
- Fungi
- Viruses



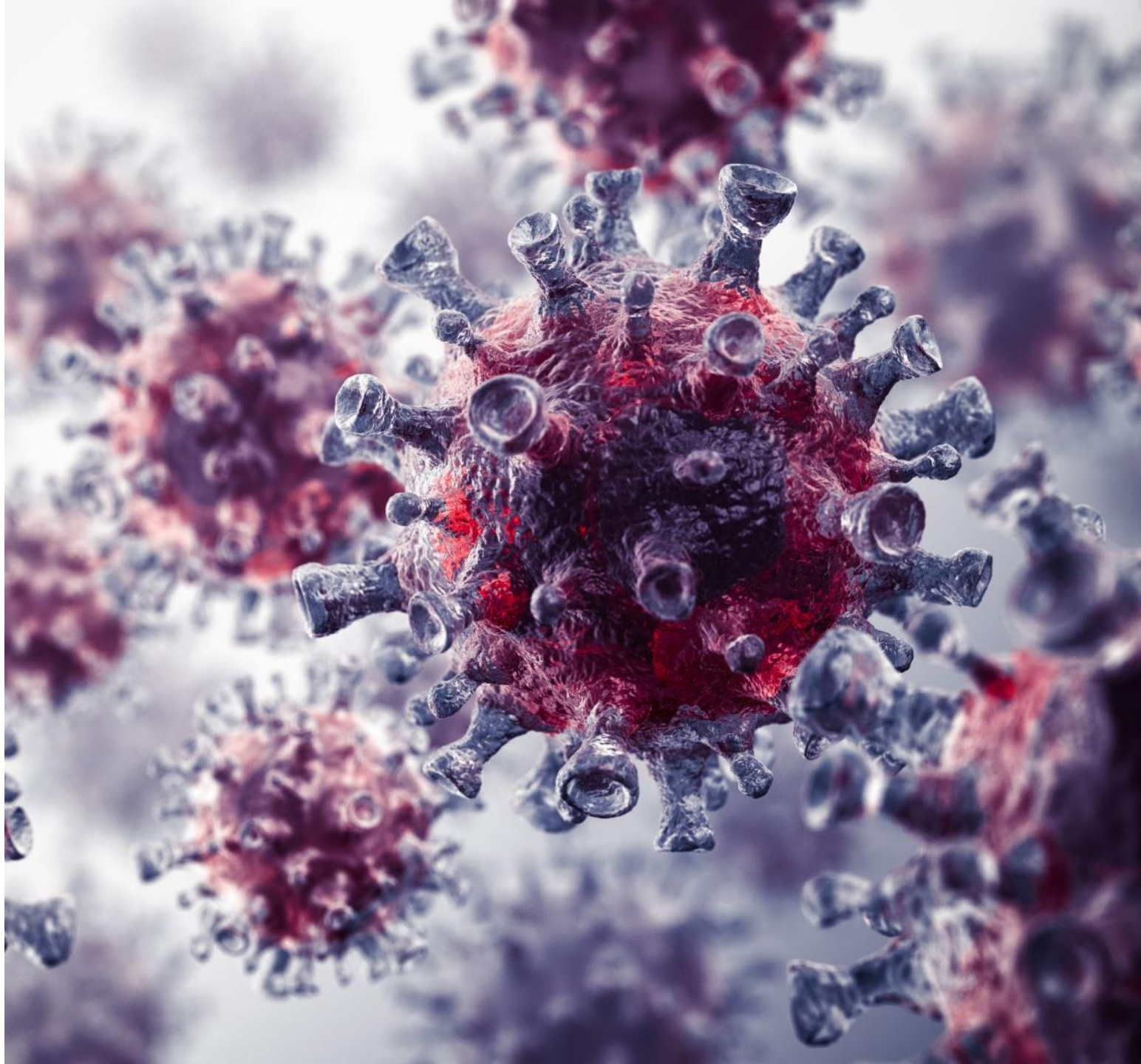
https://www.mdanderson.org/cancerwise/what-is-the-tumor-microenvironment-3-things-to-know.h00-159460056.html

What is in the TPE filter?

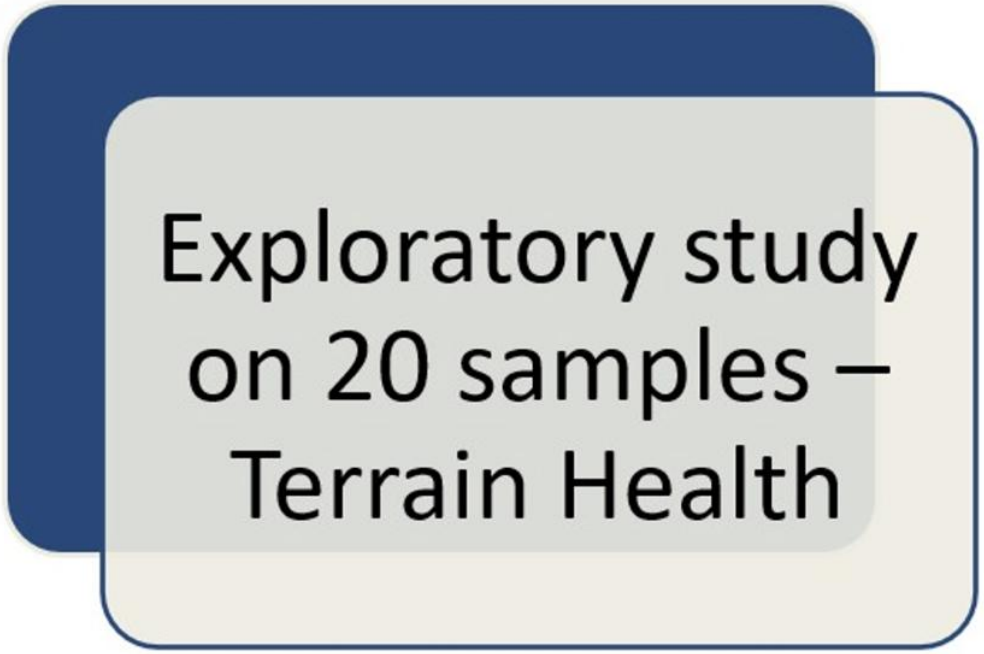
- Mold
- Heavy Metals
- Inflammatory molecules
- Microplastics
- Spike Proteins (?)
- Oncogenic signaling molecules (?)

Spike Protein

Making everything worse



Analysis of Spike Protein Fragments in Dry Blood Samples (EBOO)



Robin Rose, MD

Spike protein and toxin-like peptides before and after EBOO with filtration

Sample	14	14a
Max	541	461
Min	307	307
Spike	-	-
Average	424	384

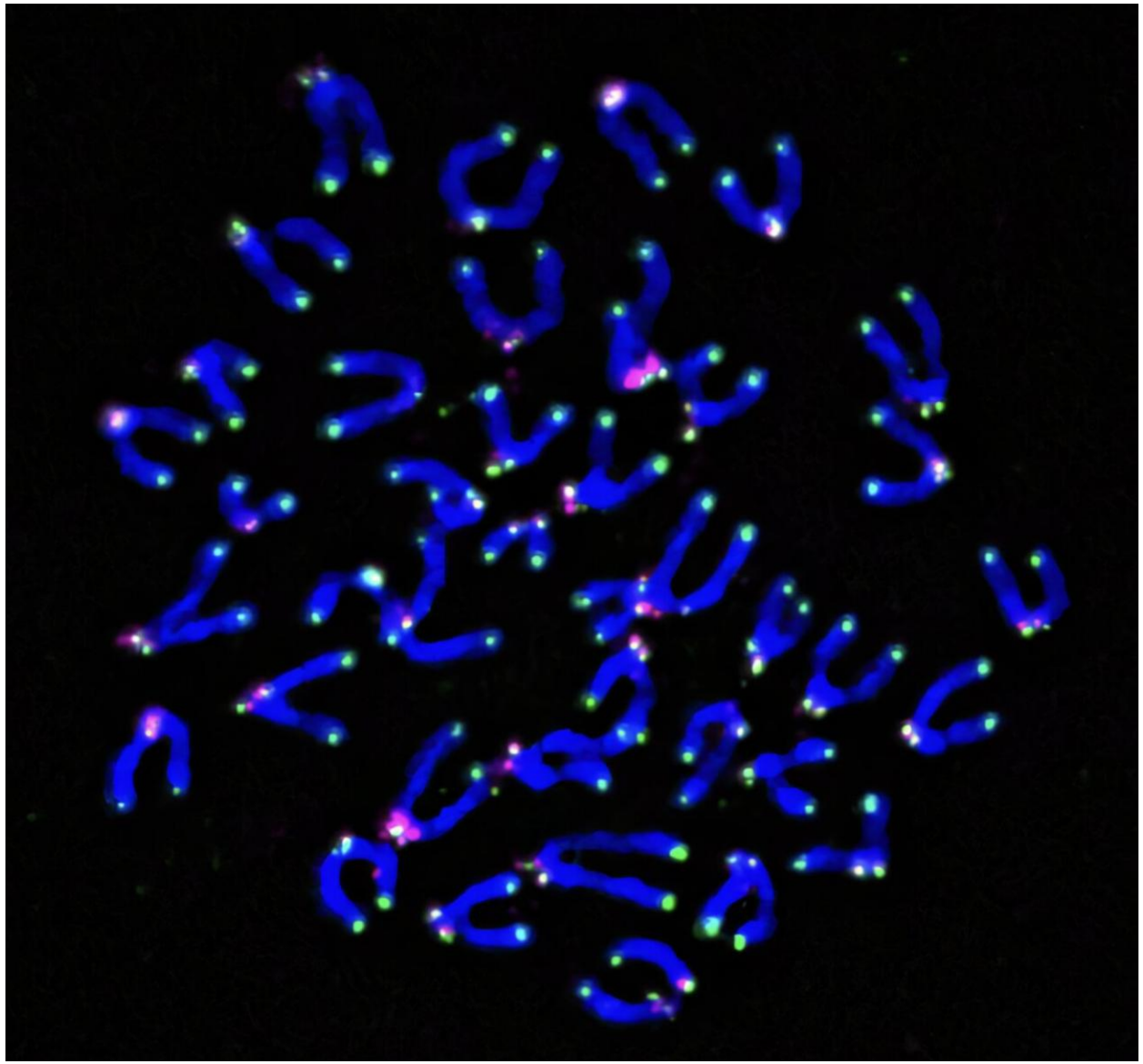
Sample	15	15a
Max	512	53
Min	311	42
Spike	34	-
Average	411.5	47.5

Sample	11	11a
Max	417	86
Min	283	29
Spike	42	-
Average	350	57.5

Robin Rose, MD

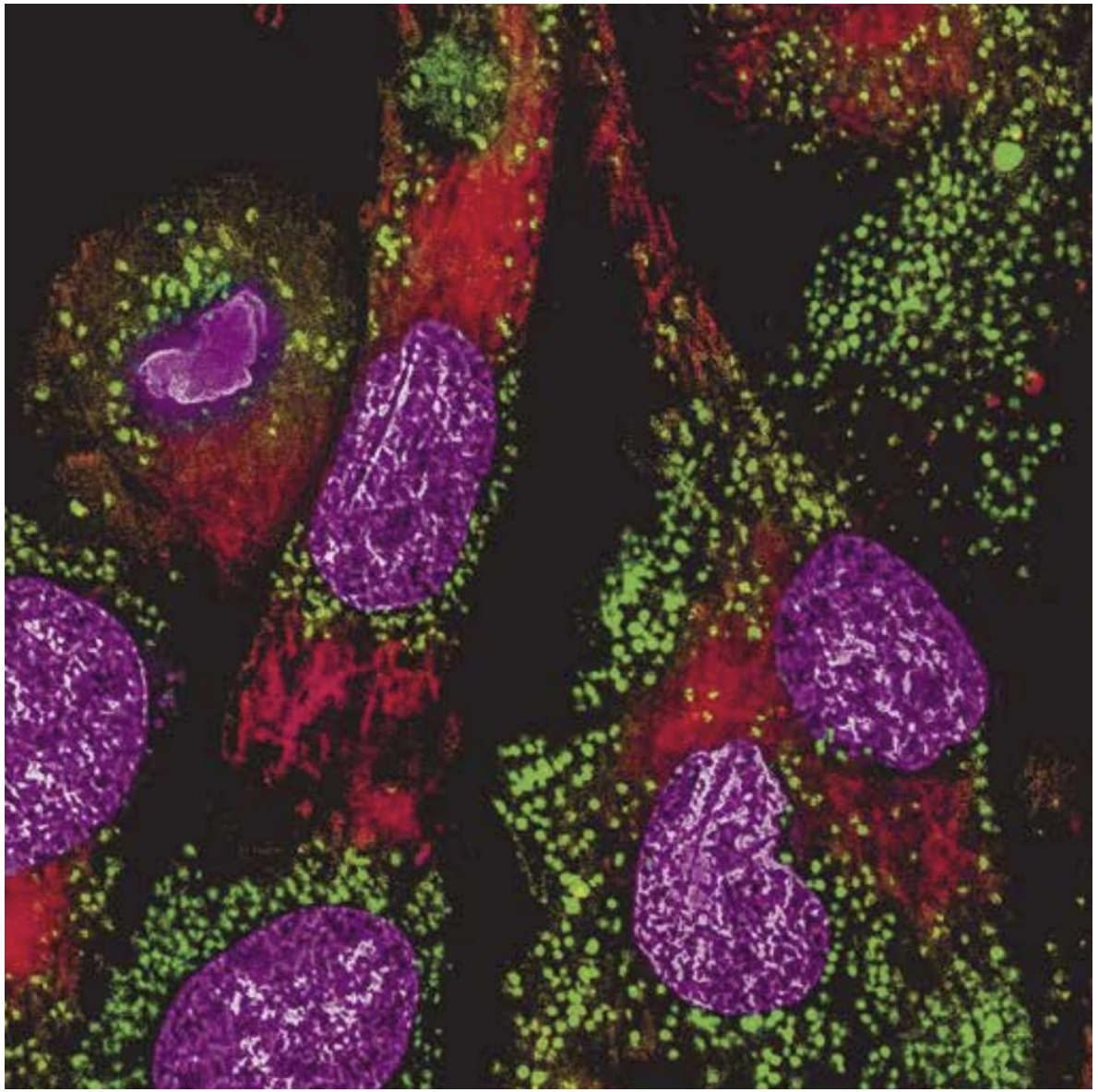
Tumor-induced exhaustion

The role for T cell telomeres



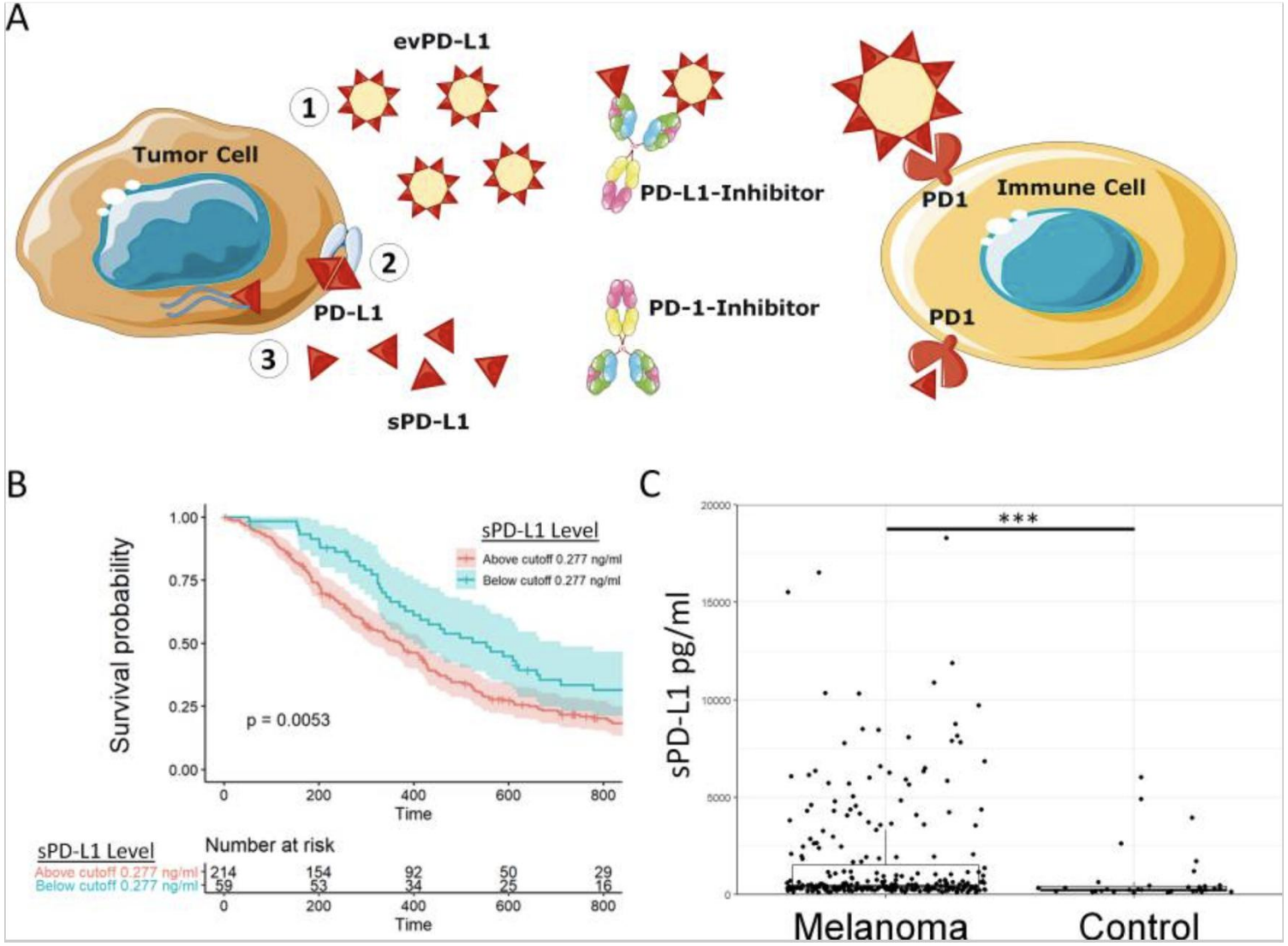
Immunity (2025). DOI: 10.1016/j.immuni.2025.08.008

- When you damage mitochondria, one of the first things that get damaged is the telomeres
- When you damage the telomeres, they talk back to the mitochondria and initiate a program that tells the cell to shut down and become exhausted



Cellular Environment

https://aonm.org/wp-content/uploads/2021/07/Cell-Danger-Response-IHCAN.pdf#:~:text=The%20Cell%20Danger%20Response:%20a%20new%20paradigm,that%20protects%20cells%20and%20hosts%20from%20harm.



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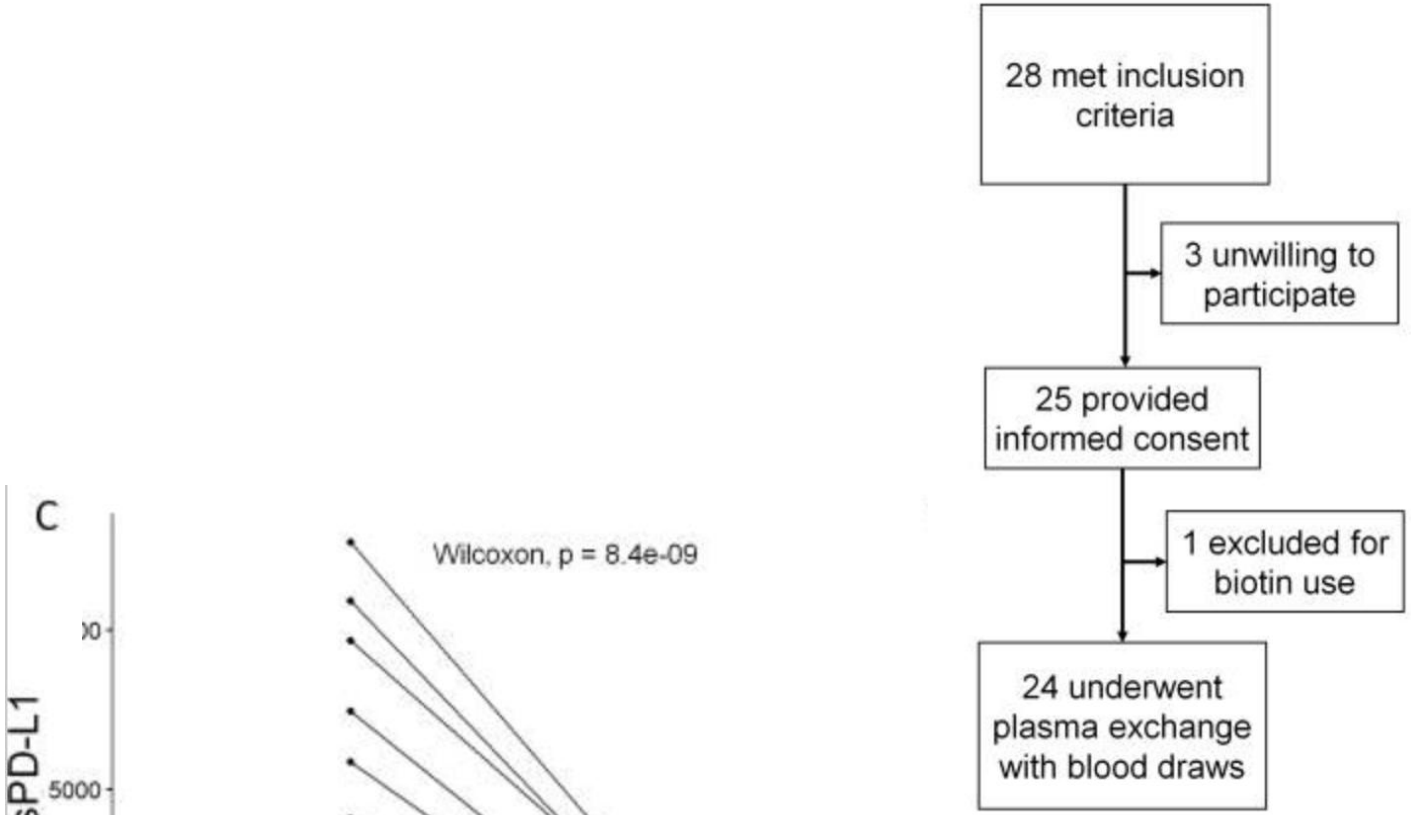

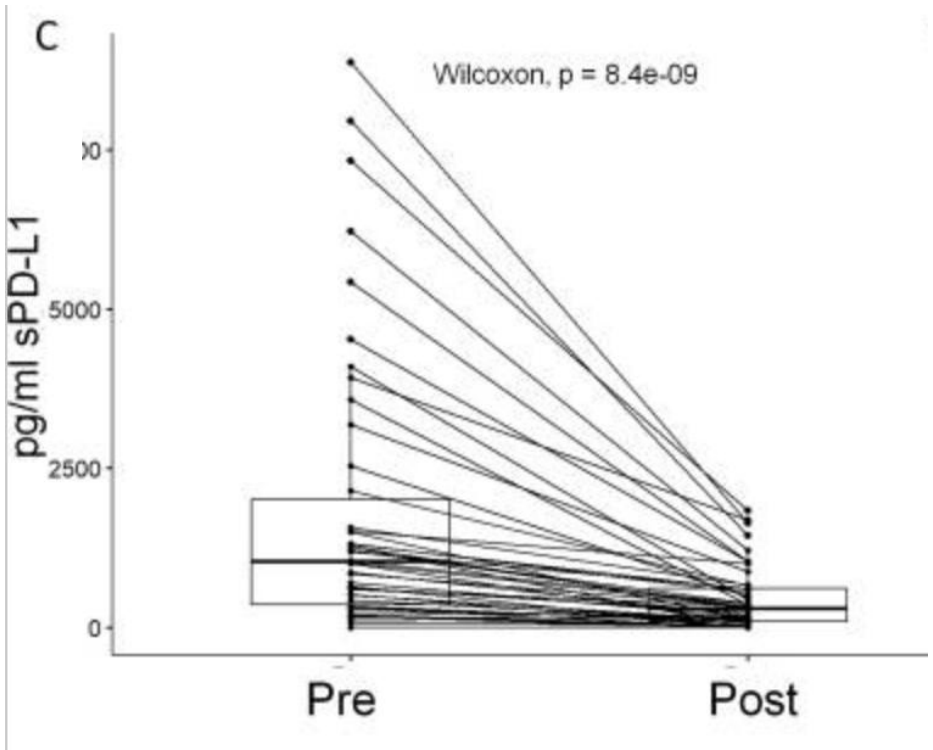

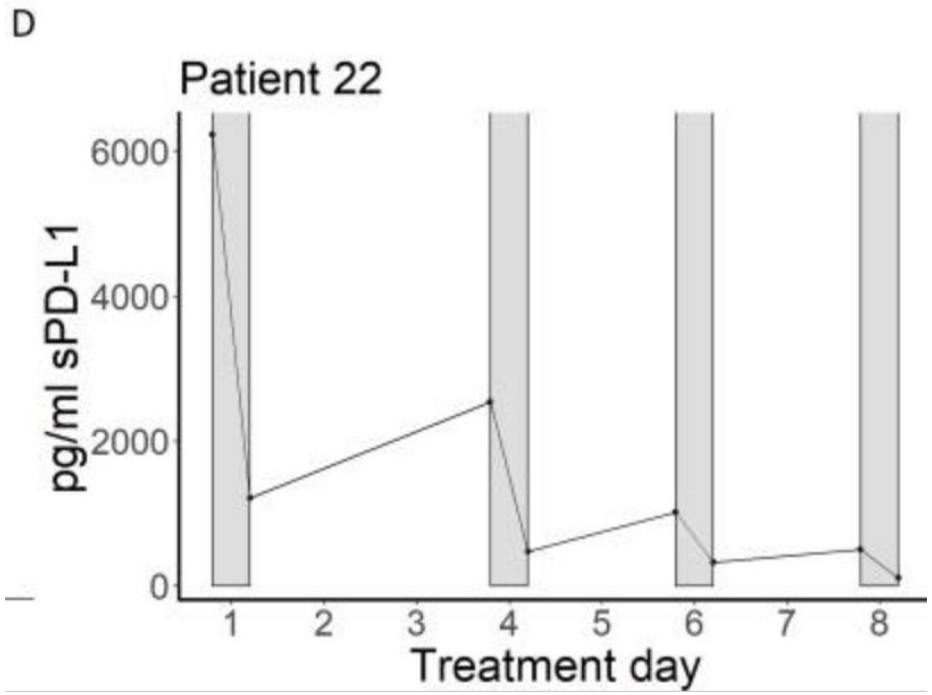

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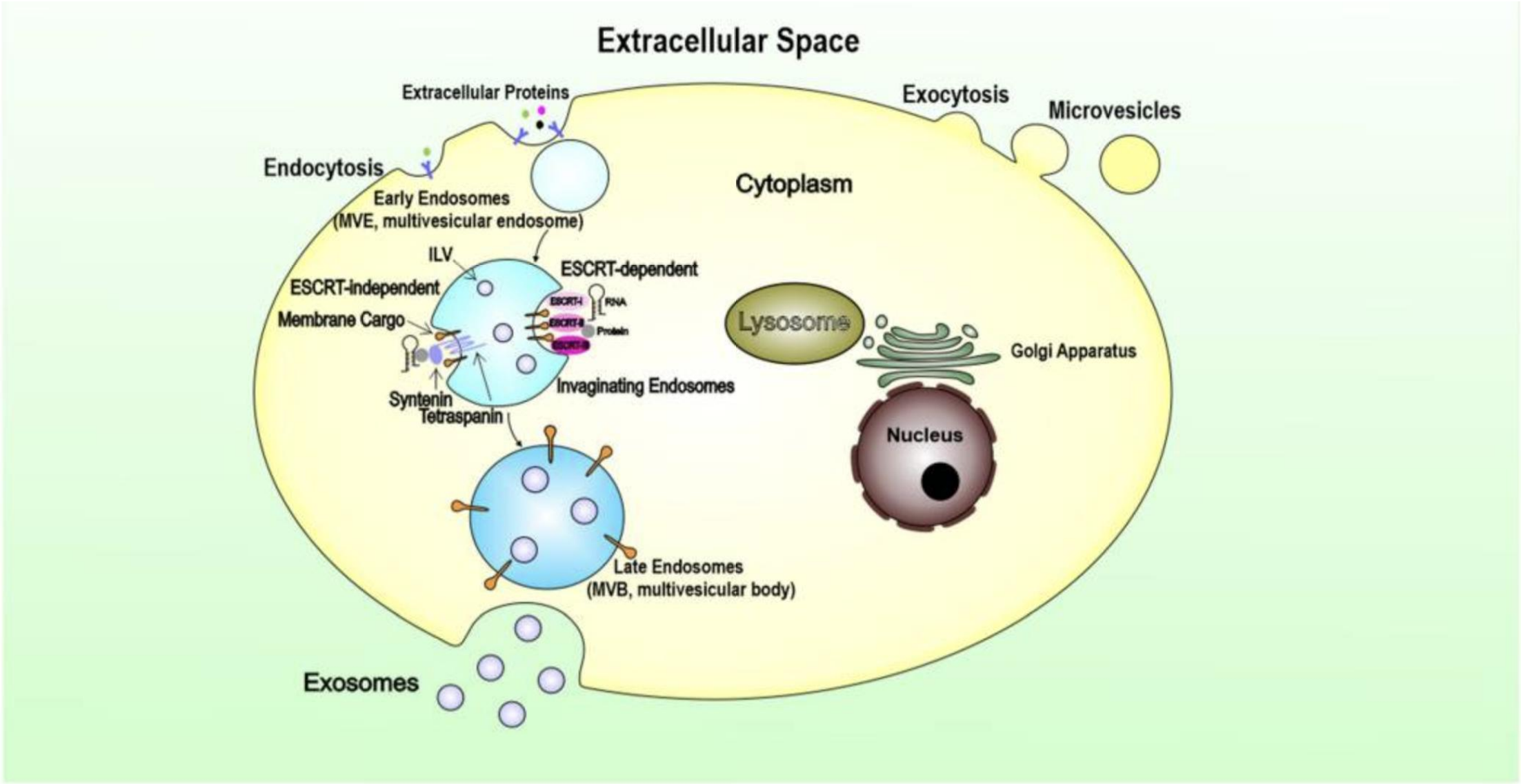
Tumor-derived Exosomes (TEX)

- Tumor-derived exosomes mediate distinct biological effects such as receptor discharge and intercellular cross-talk.

- The immune system defenses, which may initially restrict tumor progression, are progressively blunted by the broad array of TEX molecules that activate suppressive pathways in different immune cells.

Hao Q, Wu Y, Wu Y, Wang P, Vadgama JV. Tumor-Derived Exosomes in Tumor-Induced Immune Suppression. Int J Mol Sci. 2022 Jan 27;23(3):1461. doi: 10.3390/ijms23031461. PMID: 35163380; PMCID: PMC8836190.



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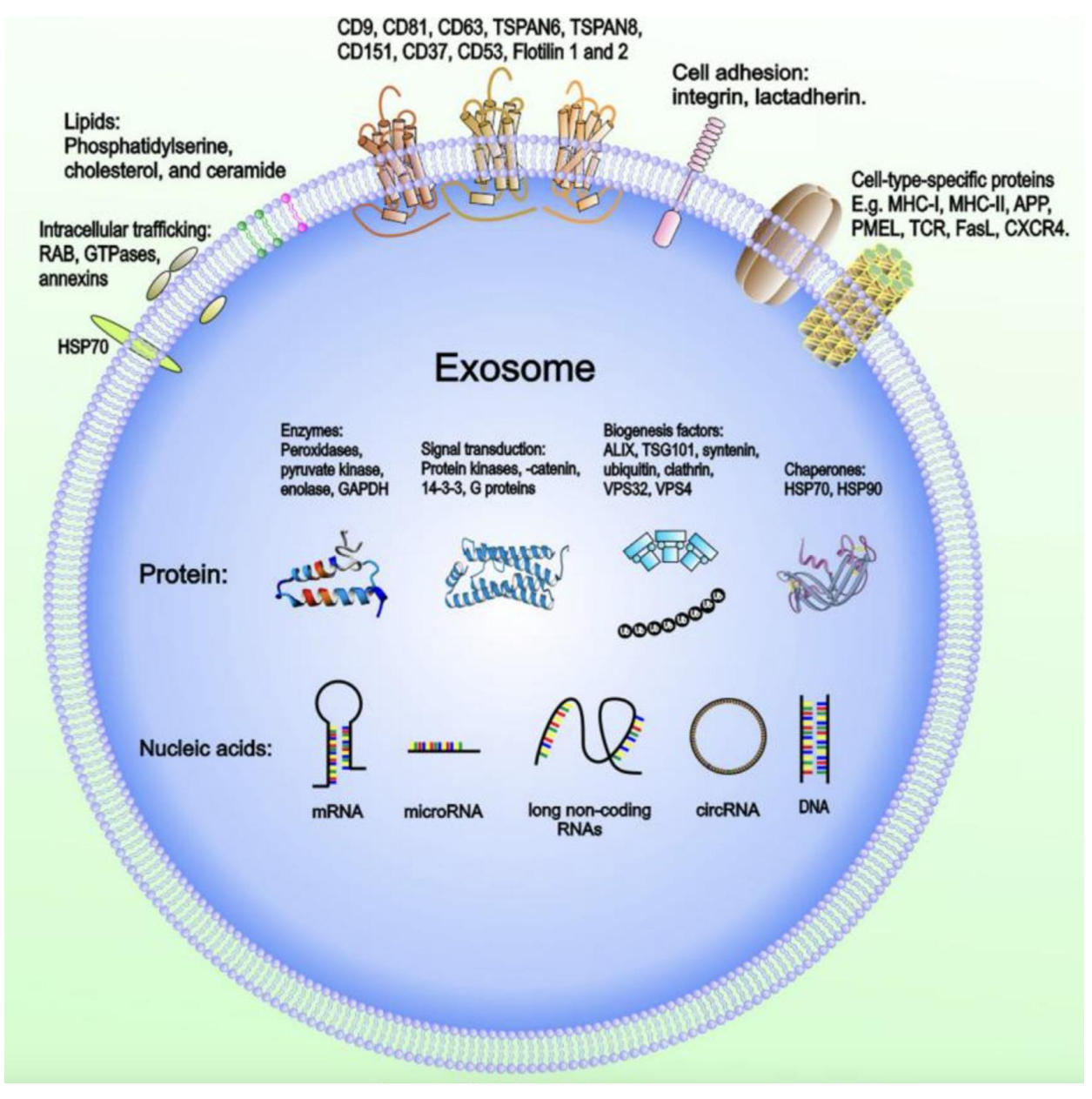
Exosome Limiting Membrane



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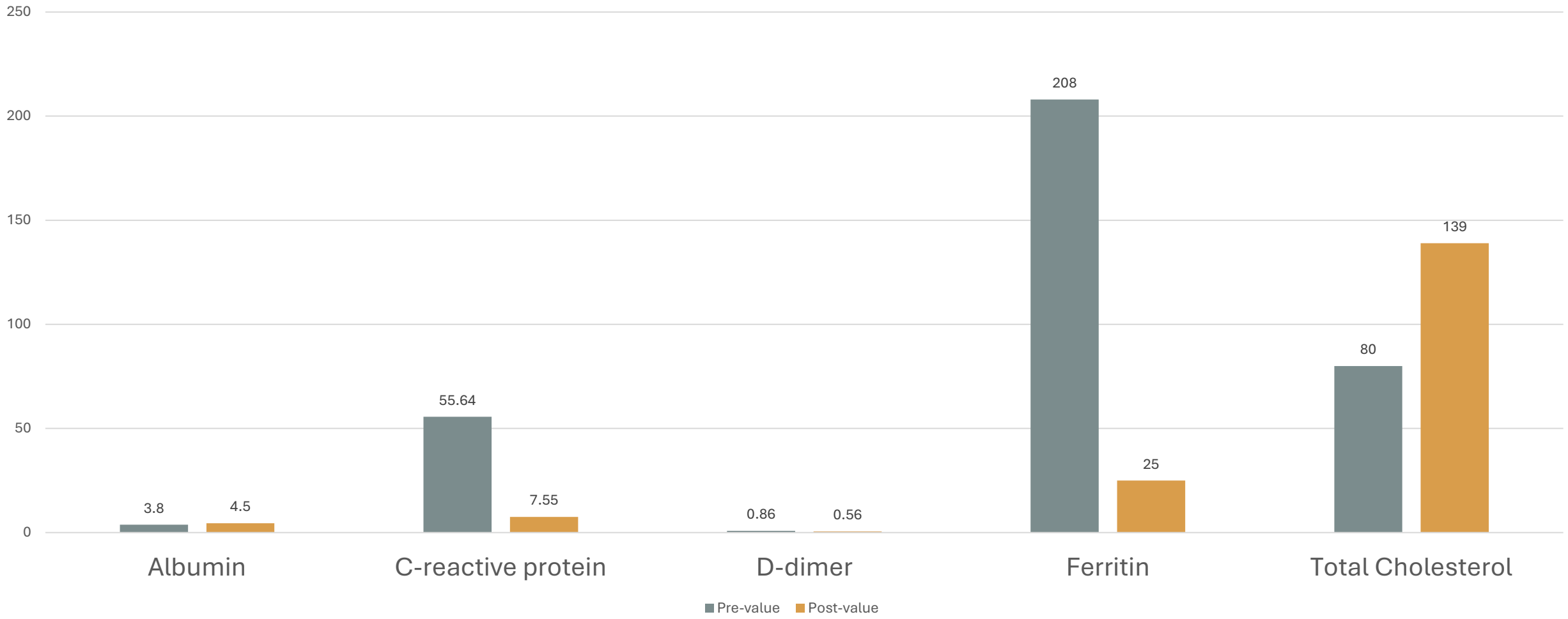
- TEX in the plasma of patients with different cancer types carry cancer-specific, distinct miR signatures, which correlate with the cancer development and responses to therapy.

- Prostate cancer cell-derived TEX was involved in tumor expansion through reprogramming of adipose-derived stem cells via oncogenic miRs miR-125b, miR-130b, and miR-155.

Whiteside T.L. Exosomes and tumor-mediated immune suppression. J. Clin. Investig. 2016;126:1216–1223. doi: 10.1172/JCI81136. Abd Elmageed Z.Y., Yang Y., Thomas R., Ranjan M., Mondal D., Moroz K., Fang Z., Rezk B.M., Moparty K., Sikka S.C., et al. Neoplastic reprogramming of patient-derived adipose stem cells by prostate cancer cell-associated exosomes. Stem Cells. 2014;32:983–997. doi: 10.1002/stem.1619.

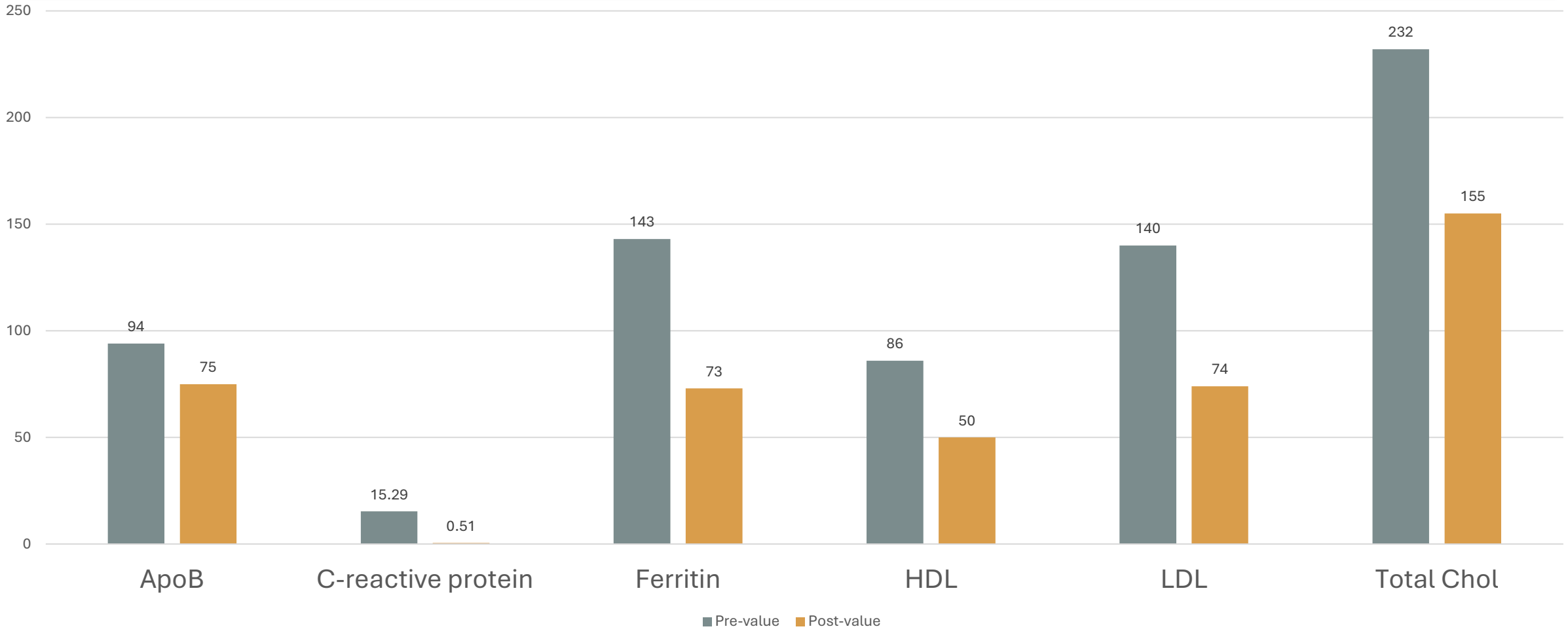
TPE Pre and Post Lab Values

Patient A.B



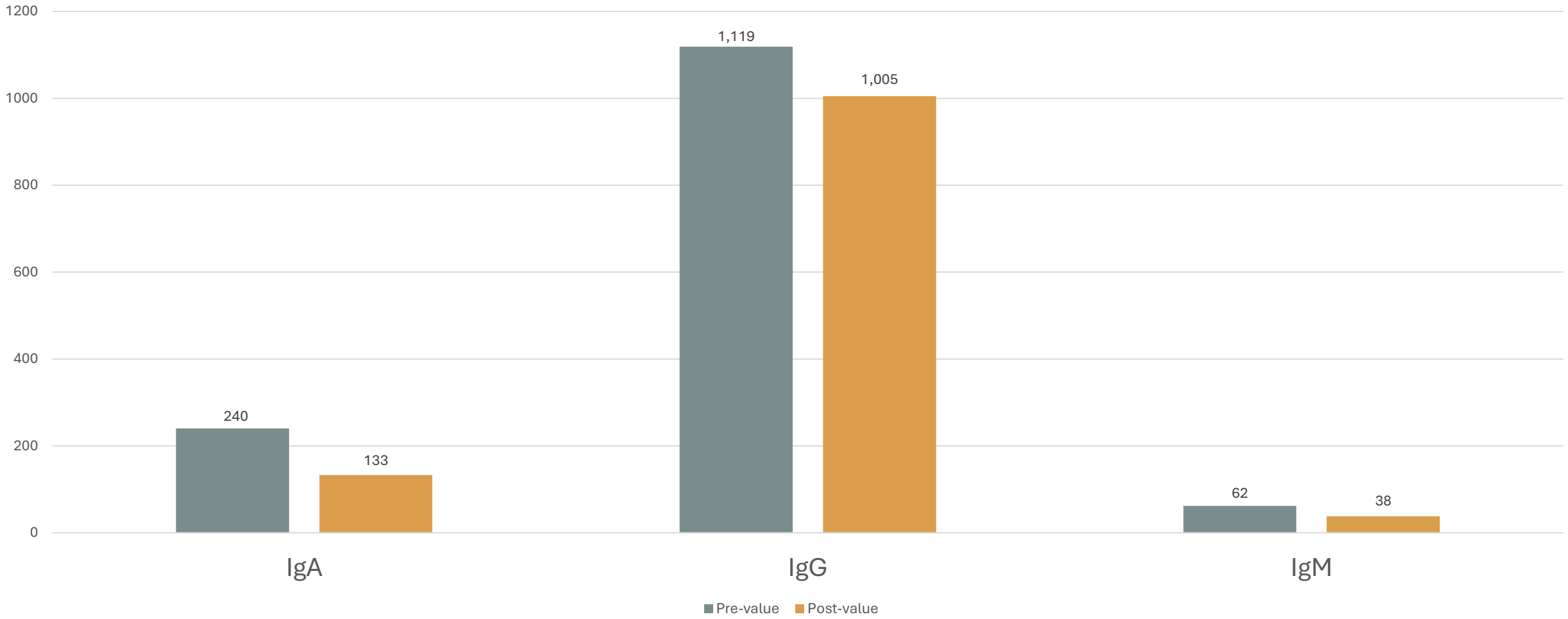
TPE Pre and Post Lab Values

Patient S.M



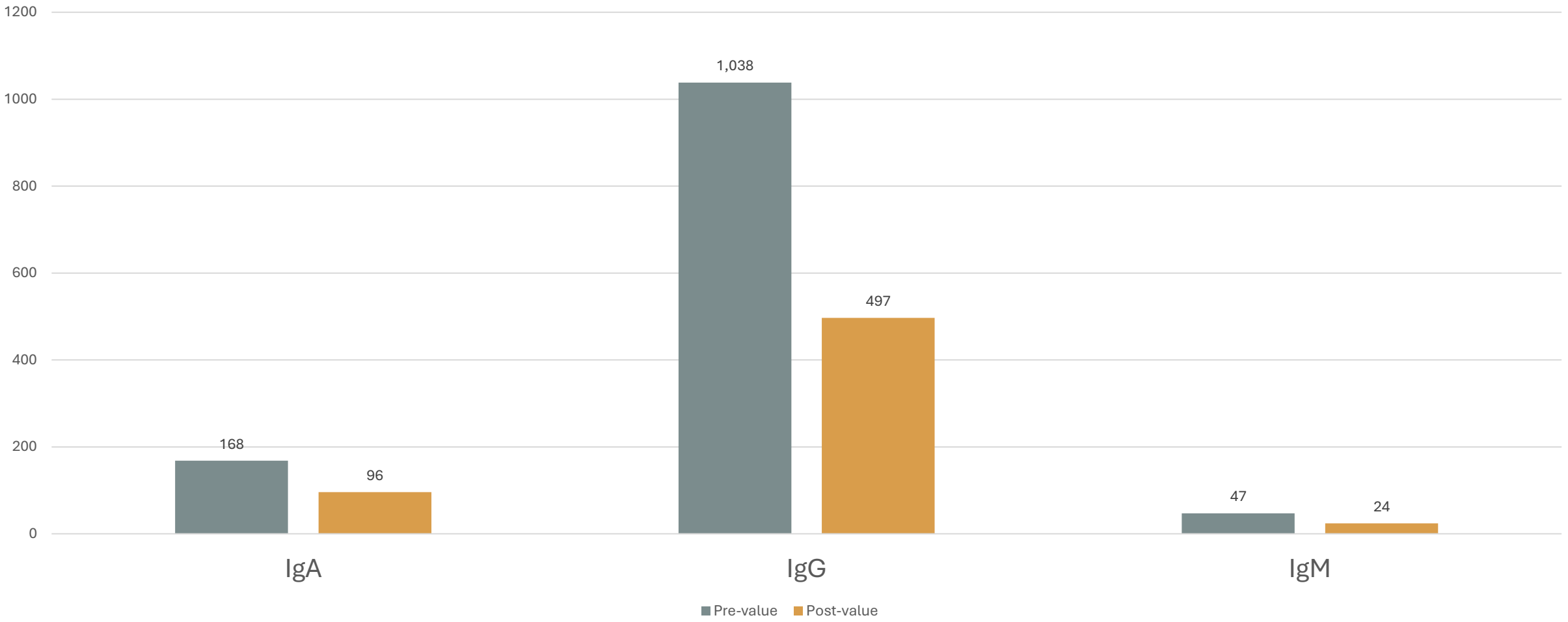
TPE Pre and Post Lab Values

Patient A.B (cont.)



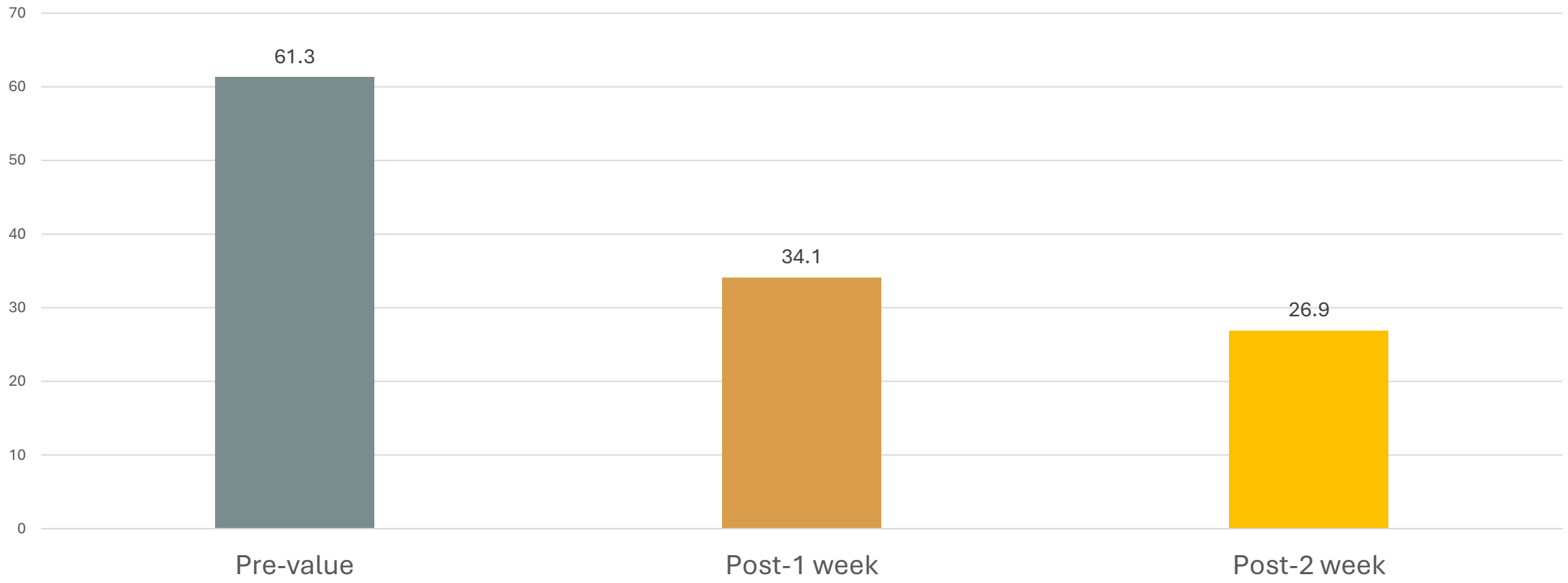
TPE Pre and Post Lab Values

Patient R.L



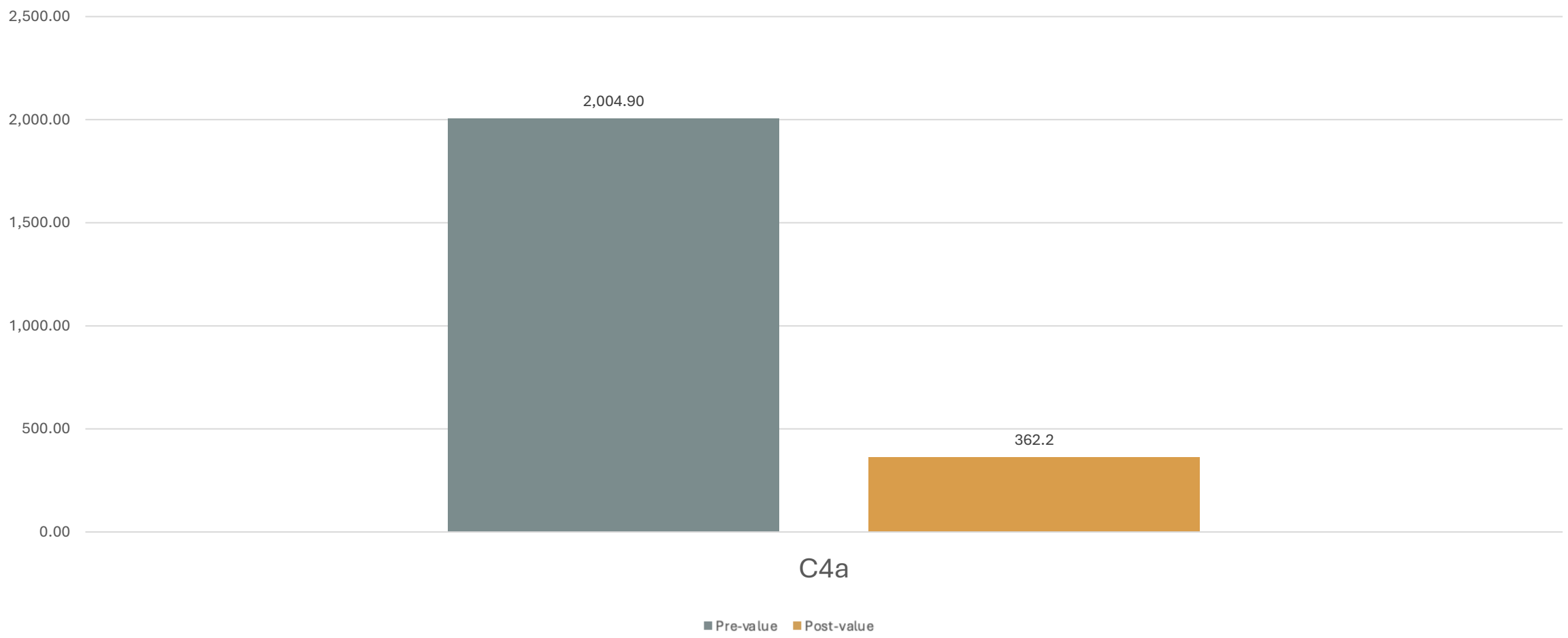
Pre and Post Leukapheresis Lab Values

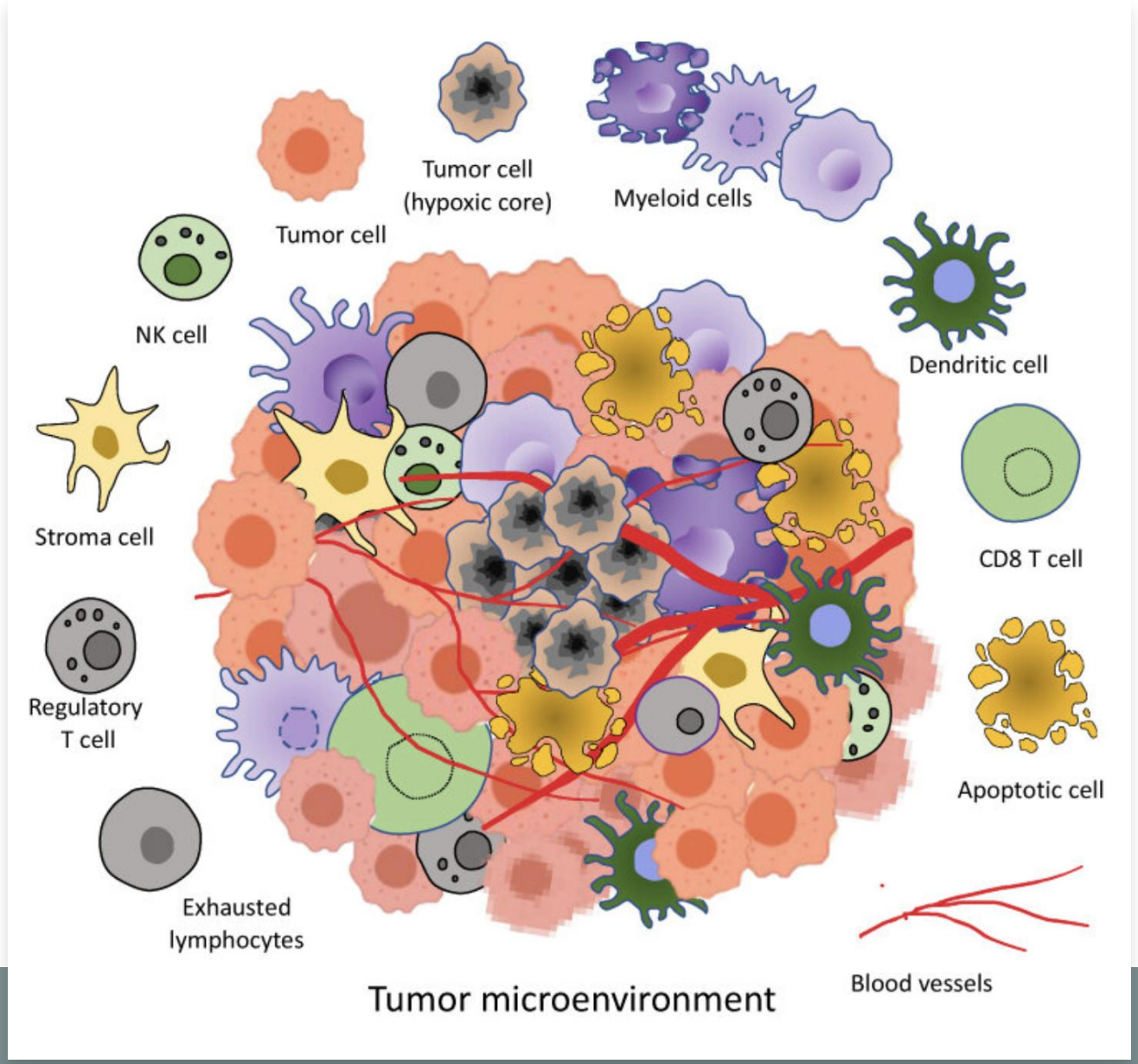
Patient R.L (Cont.)



TPE Pre and Post Lab Values

Patient J.L



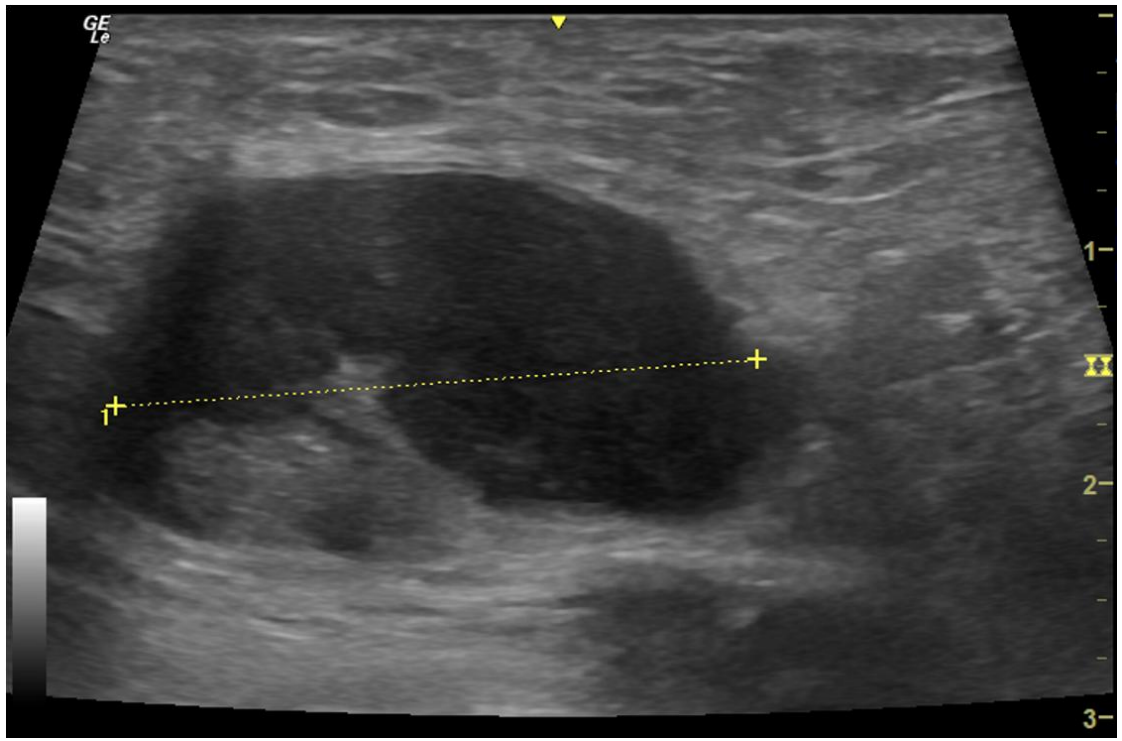


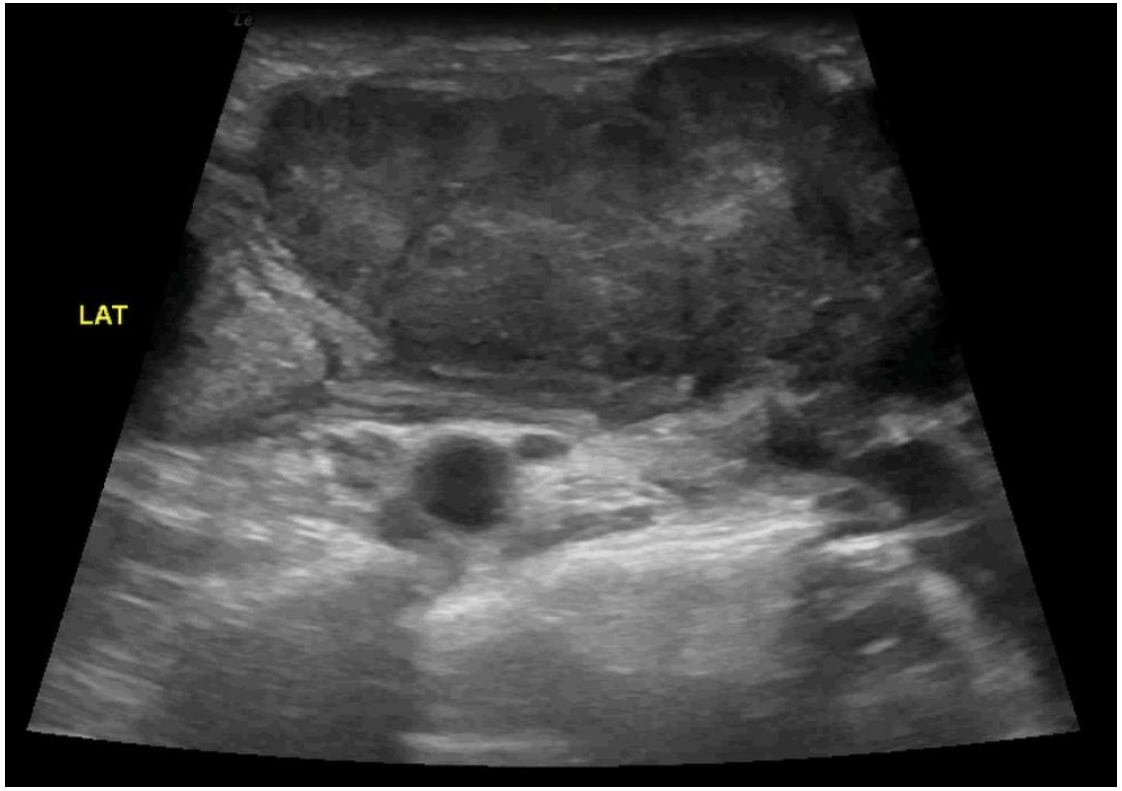
The Tumor Microenvironment

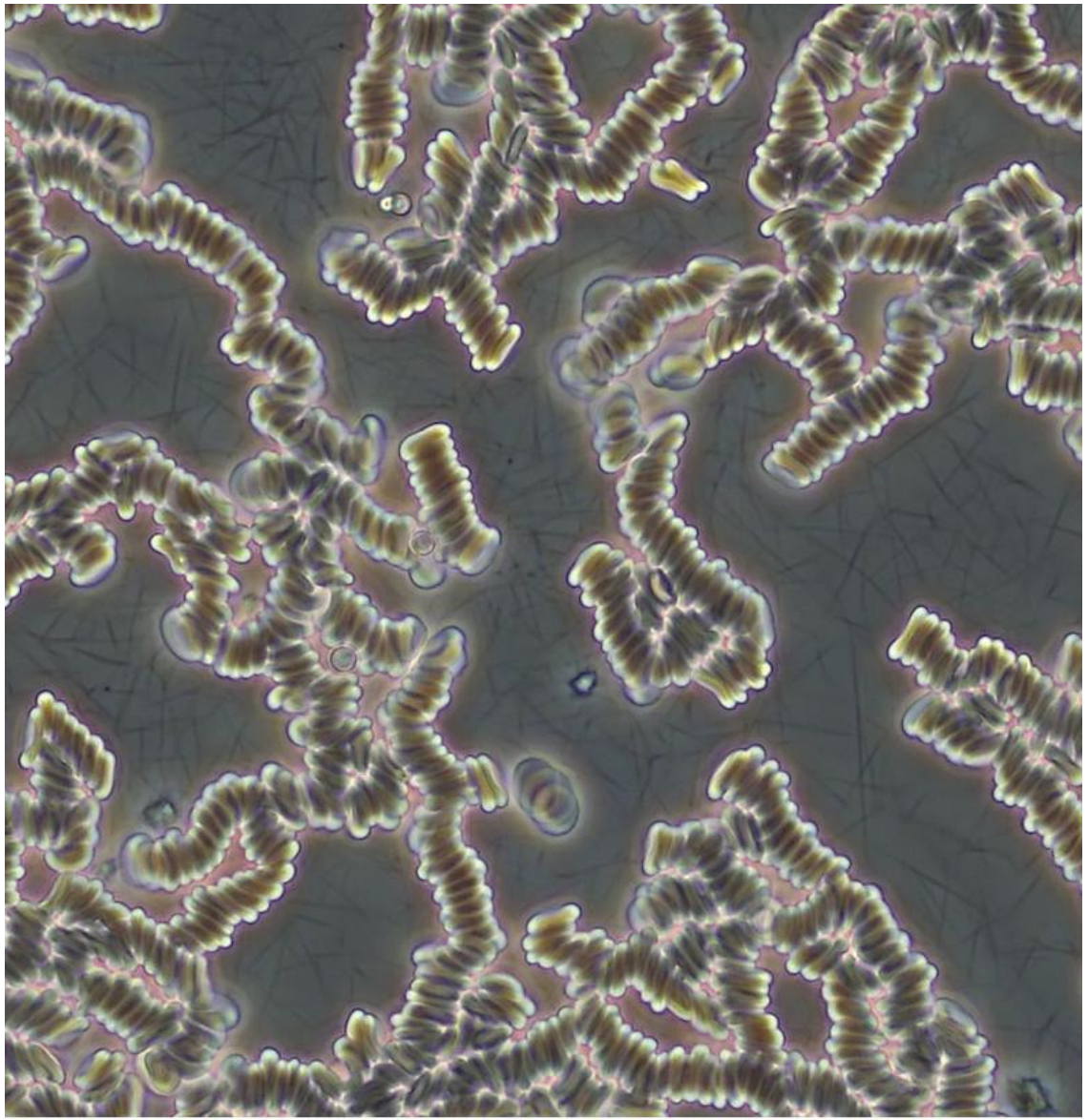
- Acidic/basic
- Hypoxia
- Immortal – mutated apoptosis pathways
- Chemokines/Cytokines for recruitment

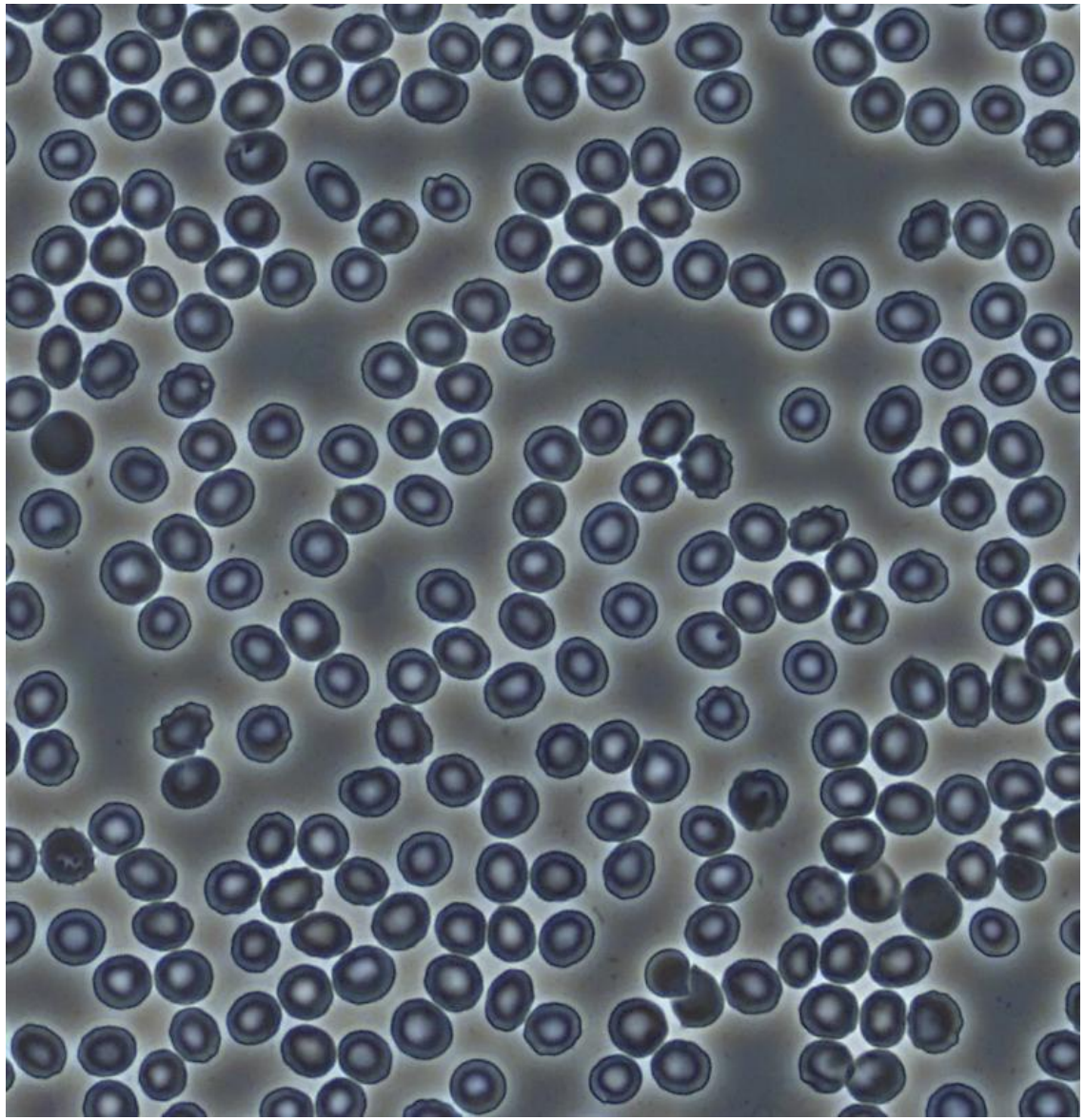
https://www.researchgate.net/figure/Tumor-microenvironment-components-It-is-a-complex-ecosystem-consisting-of-heterogenous_fig1_375407401.




GE
1
1
2
3


LAT





A.B.1

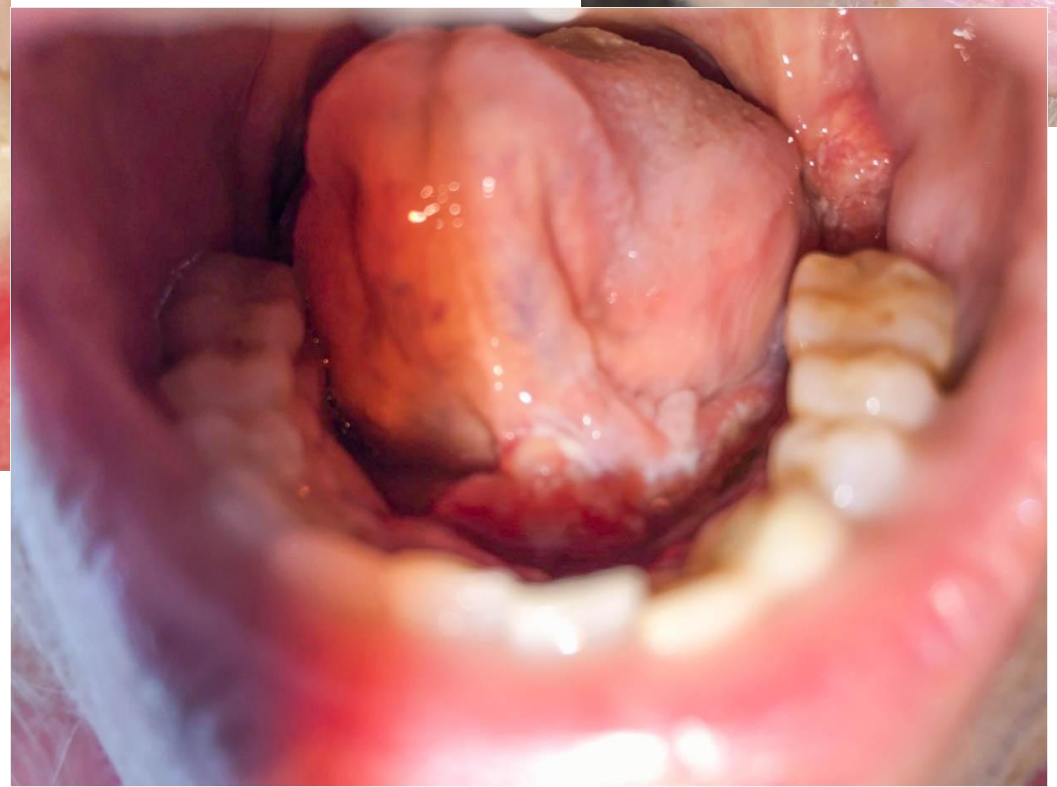
PRE

POST



9.18.25

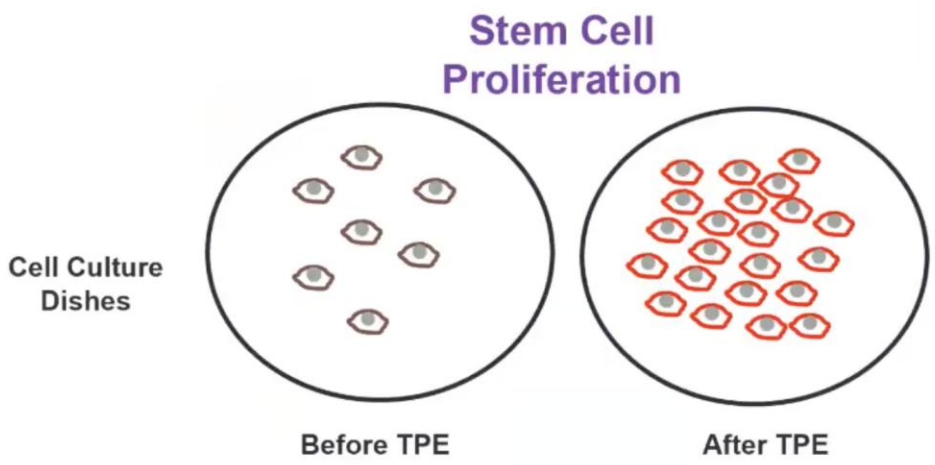
9.22.25

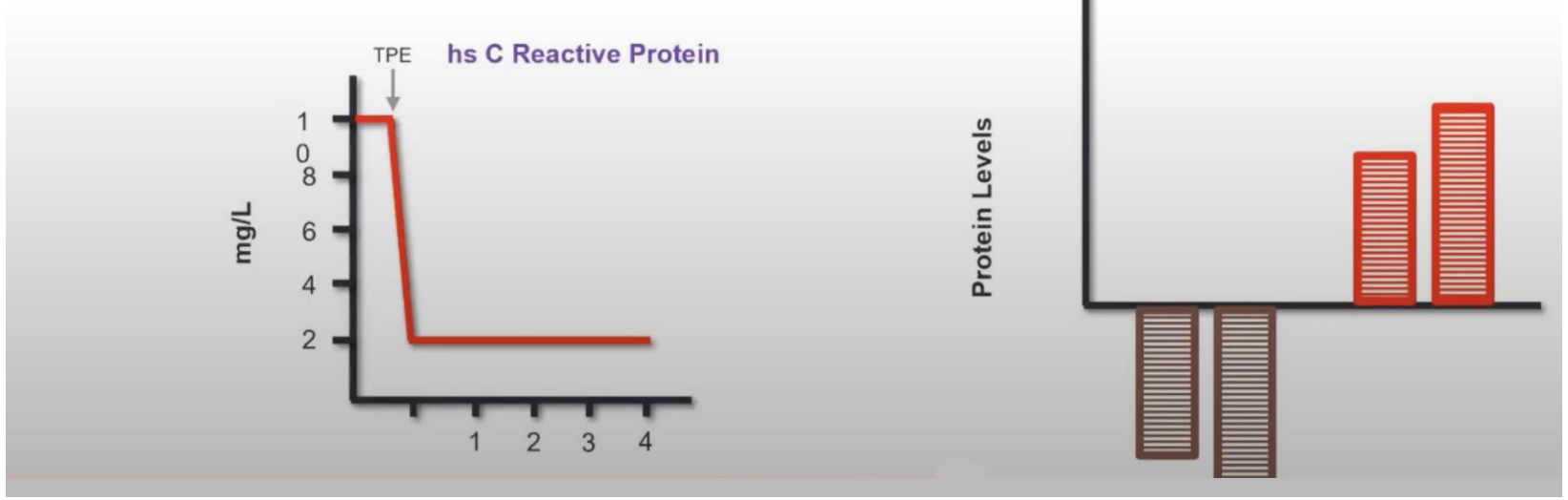




10.14.25

TPE Induced Changes





Can IV albumin contain spike proteins ?

- Studies have shown that even moderate heat above 50°C can force the spike's receptor-binding domain (RBD) into a closed, inactive conformation. At 60°C, the protein's structure is fully disrupted, neutralizing its function.

- Albumin is heated to 60 degrees for 10 hours … no virus survives it… that was shown more than 30 years ago. Large MW structures, i.e., proteins like the spike protein become misfolded and inactivated.

What human plasma looks like in late-stage cancer patients



TPE #1 (Stage 4 Cancer)

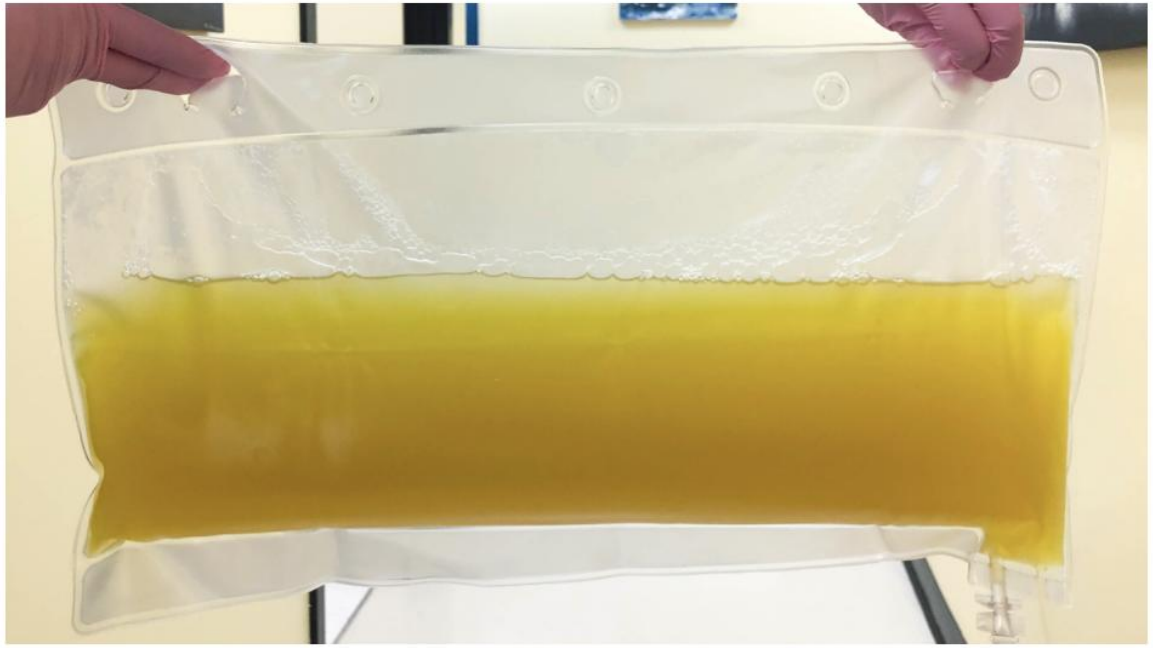


TPE #2 (Stage 4 Cancer)

POST TPE (Cancer Patient)



VS



1ST TPE

2nd TPE

Active Autoimmunity





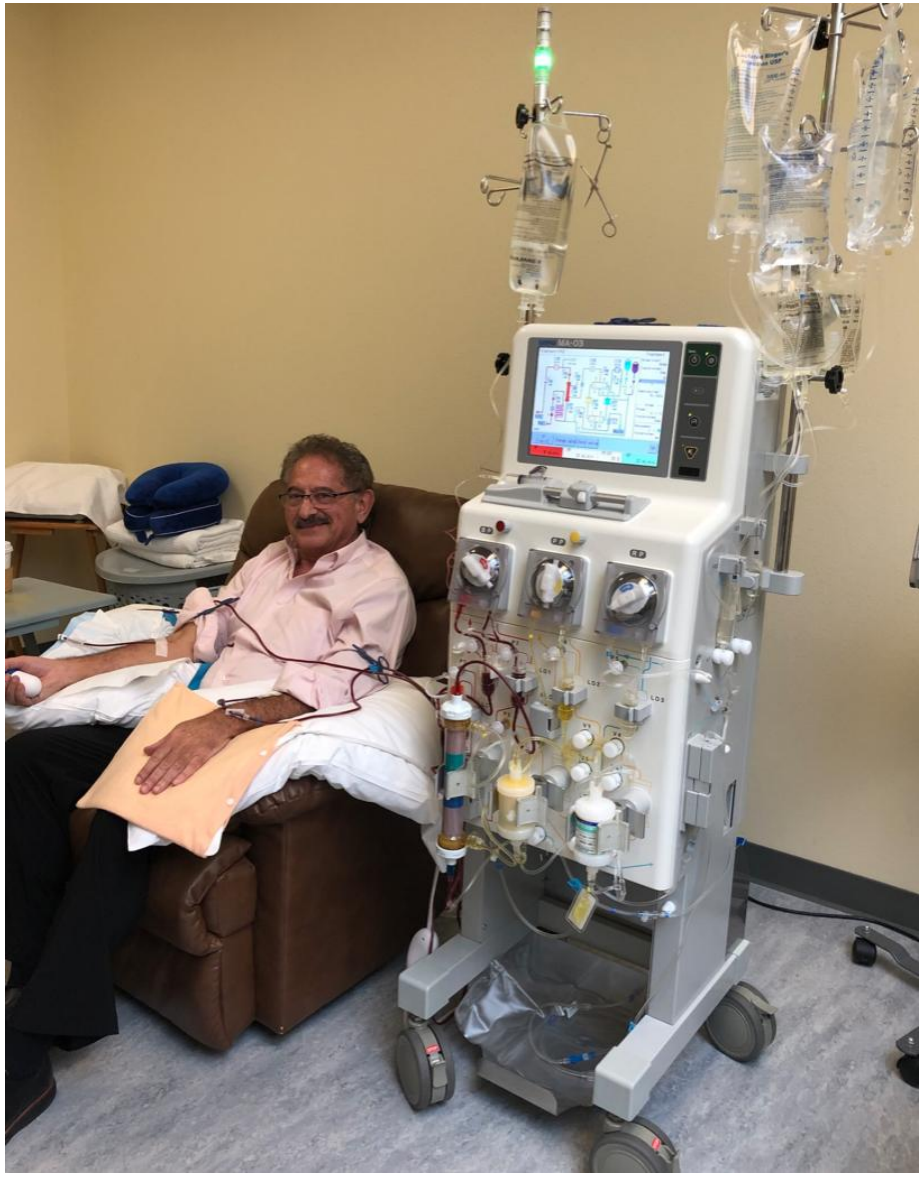
Cognitive Decline

Inactive Autoimmunity





Metastatic Cancer





Plasma Exchange with Albumin may delay tumor growth signaling

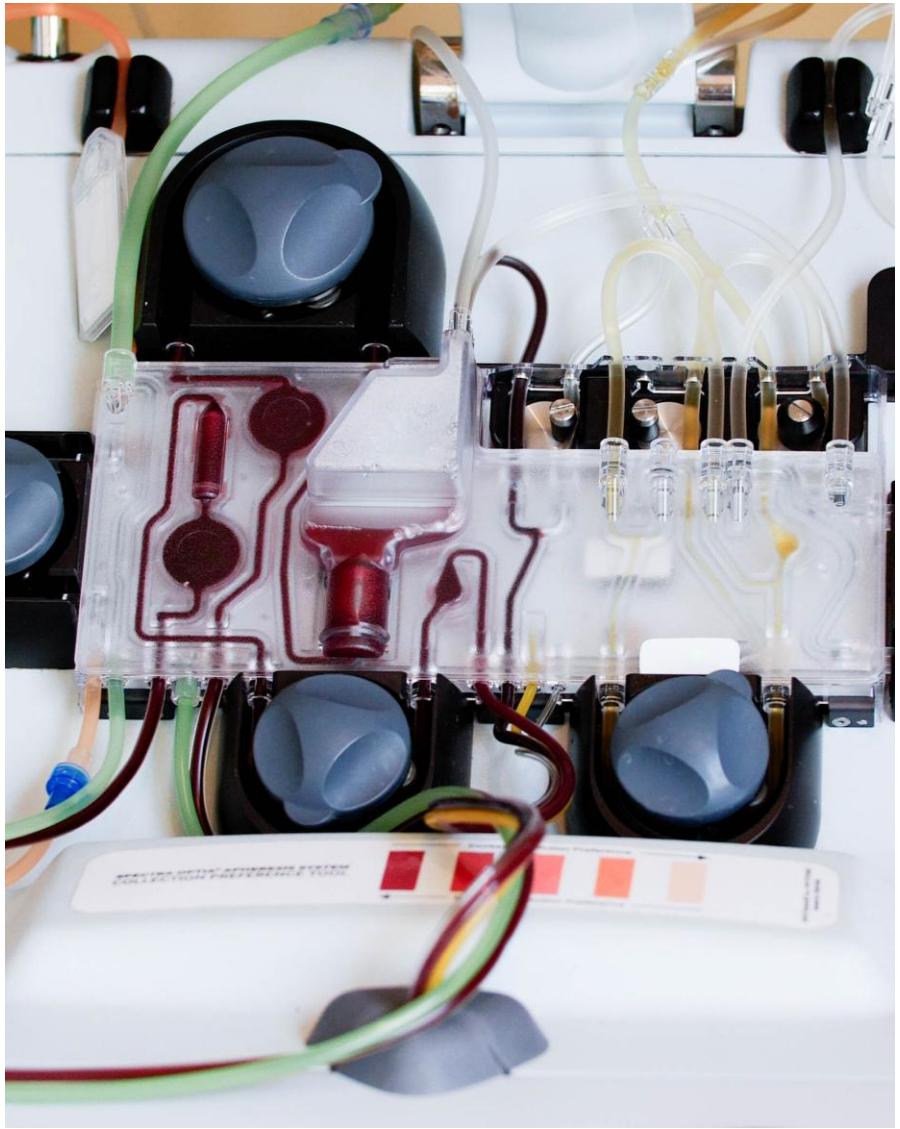
Experiments in humans show:

- Removal of pro-inflammatory factors
- Improving the balance of immunocompetent cells
- Providing potent antioxidant effects
- Improved joint stiffness and pain
- Improved liver function
- Improved renal function
- Prevents infections



Given the diversity of cell types and molecules that form the tumor microenvironment, it is necessary to apply a systems biology approach to study it

https://www.technologynetworks.com/cancer-research/articles/interrogating-the-complexities-of-the-tumor-microenvironment-367923



Therapeutic Plasma Exchange (TPE) for Stage IV Cancer

- Safe
- Immediate and Significant Reductions in Inflammatory Markers
- Significant and Transient Reductions in Lipids
- Significant and Transient Reductions in Immunoglobulins (give IVIG)
- Early Stabilization of Tumor Size and Pain
- Earlier than Anticipated Changes in Appearance in lymph nodes

- Too Early for Reduction in Tumor Size or Tumor Markers
- Literature Demonstrates Reductions in Circulating PD-L1 and in PD-L1 Exosomes

Grifols AMBAR Study in Alzheimer's Disease Placebo Controlled: Plasmapheresis vs Sham Pheresis

Clinical Study Design:



GRIFOLS

496

Patients with Alzheimer's

(ages 55-85 with mild to moderate stage)

41

Hospitals

(22 in the U.S & 19 in Spain)

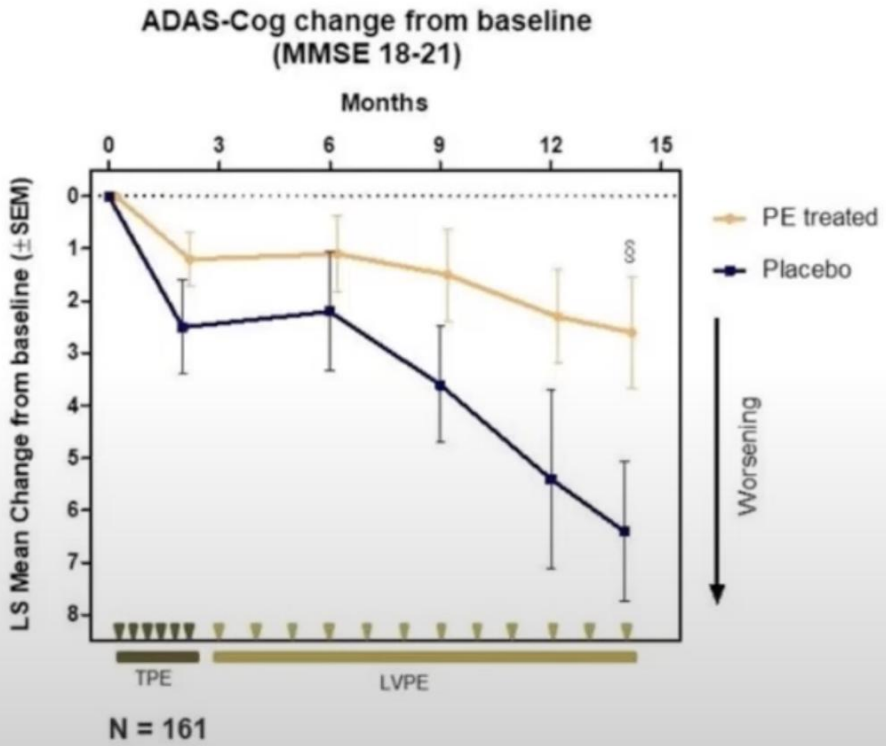
14

Months

(of treatment)

https://www.grifols.com/en/research-in-alzheimer-s-disease

ADAS-Cog: Moderate dementia group



	PE treated	Placebo
Change from baseline	2.6	6.4
Diff. *vs.* Placebo	-3.9	-
p-value	§0.05	-
Less decline	61 %	-

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Grifols AMBAR Study Results

https://www.grifols.com/en/research-in-alzheimer-s-disease

Pro-aging and Inflammatory Factors

- Inflammatory Cytokines
- Fibrinogen
- Abnormal/Misfolded Proteins
- Extracellular Vesicle (EVs)
- Oxidized Lipids
- Advanced Glycation End-products
- Autoantibodies and Immune Complexes
- Metabolic Waste and Toxins

“The young physician starts life with 20 drugs for each disease, and the old physician ends life with one drug for 20 diseases.”

— William Osler

Thank you!!

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Since 1973



Dr. Ahvie Herskowitz
ACAM_Fall 2025