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Senescent Cells and Aging: Can Therapeutic Plasma Exchange (TPE) Help Clear Them?

Senescent cells drive inflammaging through the SASP. What the research says about therapeutic plasma exchange and clearing that circulating burden.

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Aging is not just the passage of time. At the cellular level, it is largely driven by the accumulation of senescent cells, cells that have stopped dividing but refuse to die. Understanding what these cells are, and how a tool like therapeutic plasma exchange (TPE) may help clear their damage, has become one of the more exciting frontiers in longevity medicine.

What Are Senescent Cells

A senescent cell is one that has entered permanent growth arrest, usually in response to DNA damage, oxidative stress, or the normal wear of replication over a lifetime. In small amounts, senescence is protective, halting the proliferation of stressed or damaged cells before they become cancerous. The problem is what these cells do once they stick around.

Senescent cells secrete a cocktail of inflammatory cytokines, chemokines, and tissue-remodeling enzymes known as the senescence-associated secretory phenotype, or SASP (Cuollo et al., 2020). SASP factors do not stay local. They circulate in plasma and can push neighboring healthy cells into senescence as well, a process sometimes called the bystander effect. Over years, this drives what researchers call inflammaging, the chronic low-grade inflammation that underlies so much of what we associate with getting older, from joint pain and cardiovascular disease to cognitive decline.

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Why Removing Senescent Cells Matters

Most anti-aging strategies aimed at senescence fall into two categories: senolytics, which selectively kill senescent cells, and senomorphics, which suppress the SASP without killing the cell. Both approaches have shown real promise in preclinical models, but they come with limitations, including inconsistent clinical translation and the fact that senescent cells and their secreted factors are distributed throughout the entire body, not concentrated in one tissue.

This is where a systemic approach becomes appealing. If SASP factors are circulating in the blood, then a therapy that can directly remove them from circulation offers a different angle than a drug trying to hunt down senescent cells tissue by tissue.

Where Therapeutic Plasma Exchange Fits In

Therapeutic plasma exchange separates plasma from the cellular components of blood and replaces it with a clean replacement fluid, commonly an albumin solution. Because TPE removes substances independent of their molecular size, charge, or lipid binding, it is well suited to clearing the wide variety of large circulating proteins that make up the SASP, including inflammatory cytokines and senescence-associated proteins.

At Holistique, therapeutic plasma exchange is provided by Circulate Health, with our team providing the supportive protocol around it.

The idea of using plasma exchange to influence senescence itself is not new. Dr. Dobri Kiprov first proposed intermittent heterochronic plasma exchange as a way to delay cellular senescence over a decade ago (Kiprov, 2013). Since then, a clinical study out of UC Berkeley followed a small group of patients through repeated rounds of TPE and found reduced oxidative DNA damage and lower levels of p16, a well-established marker of cellular senescence, along with a measurable reduction in biological age using validated biomarker panels (Kim et al., 2022). A more recent randomized, placebo-controlled trial using multi-omics analysis confirmed that TPE, particularly when combined with IVIG, shifted biological age markers in a rejuvenating direction (Fuentealba et al., 2025). Related work has also shown that attenuating age-elevated blood factors through repositioned plasmapheresis can influence multiple systemic drivers of tissue aging, not senescence alone (Mehdipour et al., 2021).

What This Means in Practice

None of this makes TPE a cure for aging, and it is not a therapy I recommend casually. It is an invasive, extracorporeal procedure with real costs and real risks, and the research base, while growing, is still early. What I find compelling is the underlying logic: much of what drives tissue aging is not happening

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inside any one organ, it is circulating through the blood, and a therapy that can directly reduce that circulating burden may offer benefits that a targeted drug cannot.

For patients who are already candidates for TPE due to significant toxic burden or autoimmune overlap, I discuss cellular senescence as an additional dimension of what the therapy may be addressing. For most people, foundational strategies still come first: reducing oxidative stress, supporting methylation and detoxification pathways, and using nutrients and lifestyle changes that are known to influence senescence pathways, such as regular exercise and caloric moderation. TPE, when appropriate, is best understood as one tool among several, not a replacement for the basics of healthy aging.

The Bottom Line

Senescent cells are one of the clearest biological hallmarks of aging we can now measure, and the accumulating evidence on therapeutic plasma exchange suggests it may do more than clear toxins. It may help clear some of the inflammatory burden that senescent cells leave behind in the bloodstream. As this research matures, it adds another layer to how we think about longevity medicine: not just adding what is missing, but removing what has accumulated.

If you want to understand whether therapeutic plasma exchange or other detoxification strategies make sense for your own health picture, our team at Holistique Medical Center is here to help you build a personalized plan.

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