THE FRONT ROW
at Scripps Research

Regenerative medicine for the treatment of MS: Enhancing repair to prevent progression

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ABOUT THE LECTURE

While tremendous progress has been made in treating multiple sclerosis (MS), current therapies still fall short of safely halting or reversing the disease. In his lecture, Scripps Research professor Luke Lairson explored the underlying biology of MS and shared how his lab is developing small-molecule therapies that stimulate remyelination. He emphasized potential regenerative strategies to treat progressive MS, as well as the broader implications for aging and brain repair.

TOP TAKEAWAY POINTS

- MS is a debilitating autoimmune disease of the central nervous system that disproportionately affects women and people in developed countries farther from the equator. It causes demyelination—damage to the protective myelin sheath coating neurons—and leads to irreversible neurological symptoms. While most patients have a relapsing-remitting form of the disease that is easier to manage, progressive MS is much harder to treat.

- B cells, a type of immune cell, play a major role in MS disease progression. Antibody-based therapies that remove B cells have significantly reduced relapse rates and lesion formation. Research strongly suggests that Epstein-Barr virus (EBV) may trigger MS by infecting and transforming B cells, ultimately provoking the immune system to mistakenly attack the nervous system.

- Unlike relapsing-remitting MS, progressive MS involves a breakdown in the body's ability to repair damage. This is due to a lack of functioning oligodendrocyte progenitor cells (OPCs), which are essential for restoring the damaged myelin. Without functional OPCs, the body cannot remyelinate neurons, leading to continued decline.

- Remyelination capacity declines with age due to changes in the tissue environment, not necessarily the cells themselves.

- Luke Lairson's lab is developing small molecules that stimulate OPCs to mature into myelinating oligodendrocytes. Their approach was validated when clemastine, an older allergy medication, demonstrated the first clinical evidence of drug-induced remyelination in MS patients. Other agents, like bexarotene, and lifestyle factors such as exercise have also shown promise in promoting myelin repair.

- While clemastine and bexarotene are promising, their clinical use is limited by dose-related side effects. Lairson's team is now identifying safer, next-generation M1R antagonists—drugs that work by the same underlying mechanism—and exploring combination therapy approaches. Additives such as high-dose vitamin D may enhance OPC maturation while maintaining safety.

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