TECHNOLOGY SHOWCASE

world changing medical technologies

THE OHIO STATE UNIVERSITY

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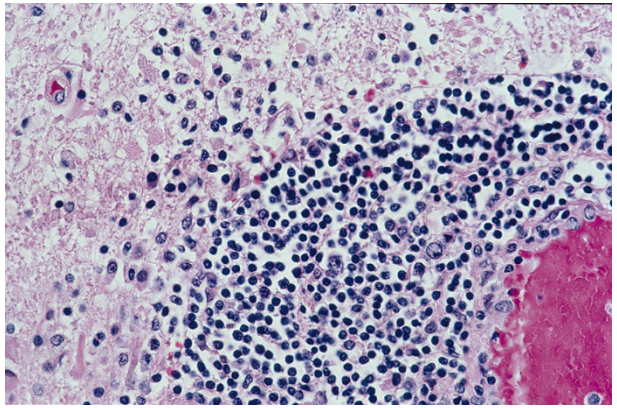
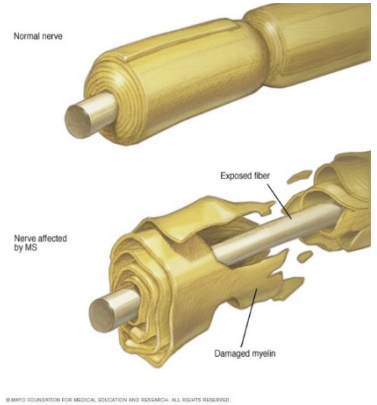
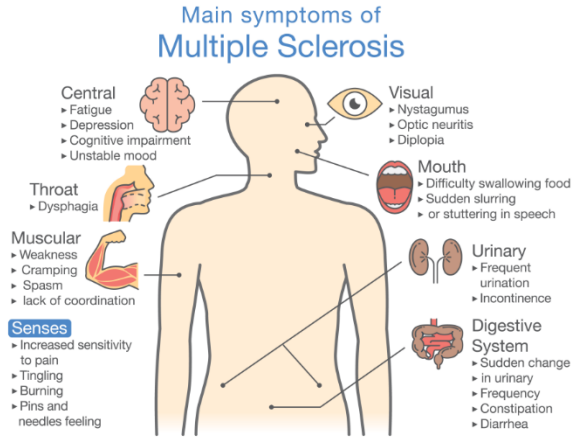
Novel small molecular STAT3 inhibitor for Multiple Sclerosis(MS)

Perivascular Inflammation

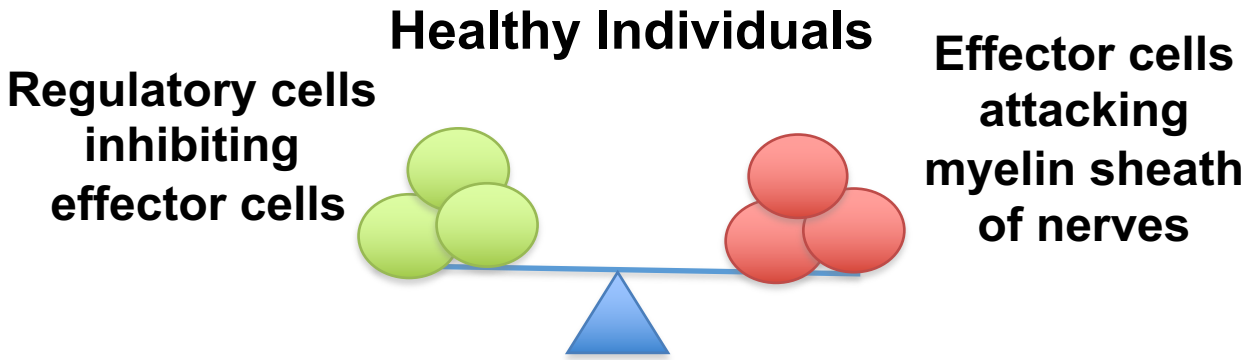


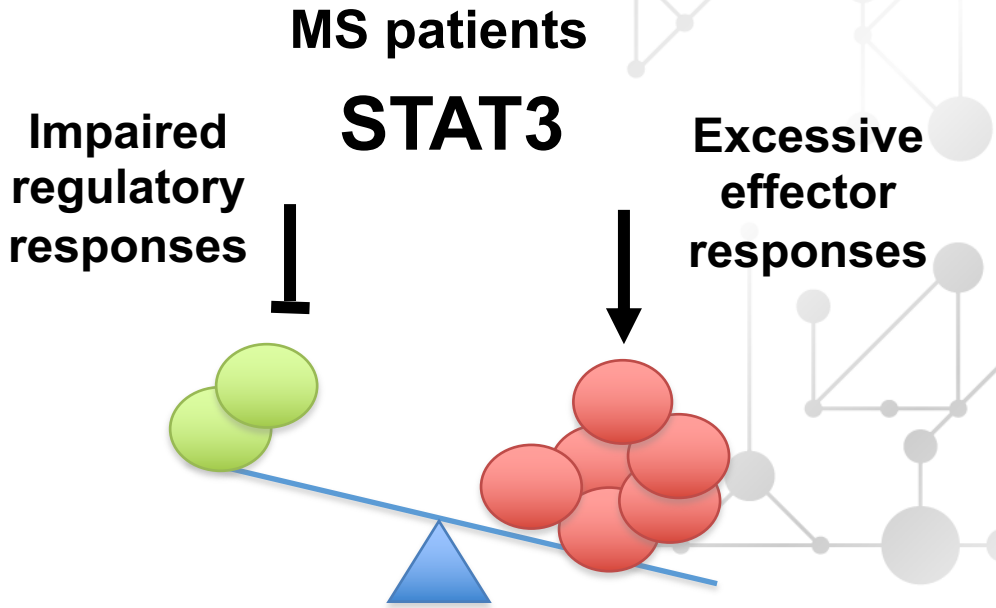




MS is an immune-mediated chronic central nervous system disease characterized by neuroinflammation, demyelination and neuronal degeneration. The immune cells, which are shown in this picture as the blue cells, enter the white matter of brain and spinal cord to attack the myelin sheath wrapping our nerves. As a result, in MS patients, the nerves were exposed and damaged, which leads to the disruption of nerve signals, causing unpredictable symptoms ranging from tingling, numbness to blindness and paralysis.

PROBLEM STATEMENT





Two major populations of lymphocytes:

- Effector Cells: attack nerves, represented by red cells here
- Regulatory Cells: inhibit effector cells, represented by green cells

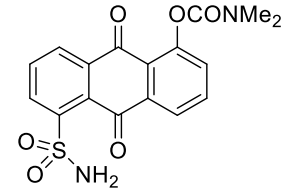
Healthy individuals: balance between these two populations, so effector cells can't attack our nerves and develop MS
MS patients: balanced skewed toward excessive effector response causes damage to nerves

In MS patients, signaling molecule STAT3 in at a higher level than HCs. I previously demonstrated that cytokine IL-6 and signal molecule STAT3 skews this balance toward effector response.
We have decided to develop STAT3 inhibitor to restore this balance for MS therapy.

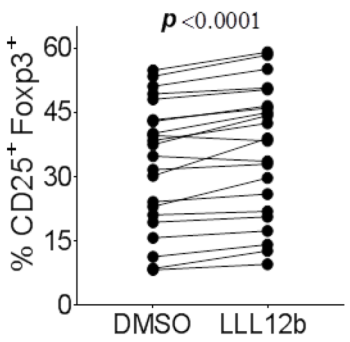
TECHNOLOGY SOLUTION

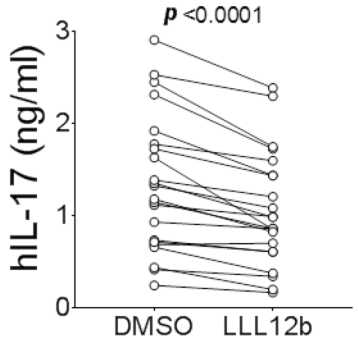
Lymphocytes from MS patients

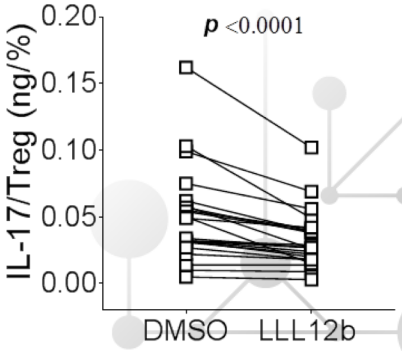
Novel small molecule STAT3 inhibitor LLL12B improves Effector:regulator balance

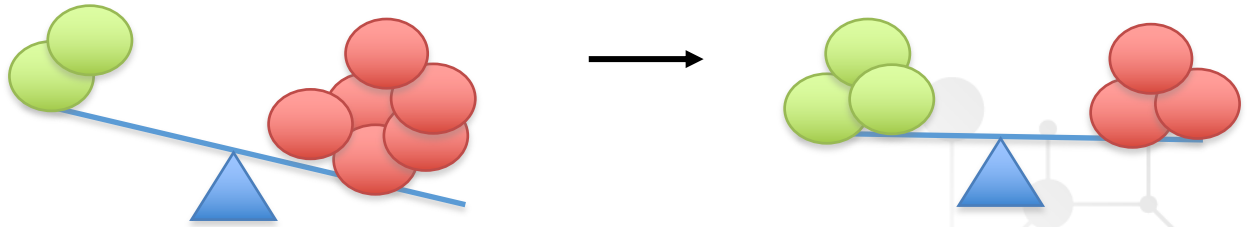


LLL-12B







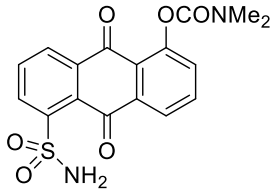


We also treat the immune cells from MS patients to see if LLL12b can restore effector/regulator balance. The answer is yes; we show that LLL12b increases regulatory cells and suppresses effector cells.

TECHNOLOGY SOLUTION

Murine MS model

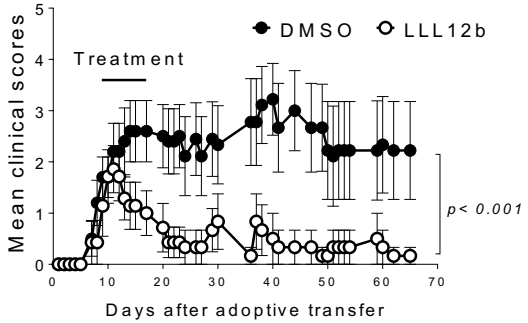
Novel small molecule STAT3 inhibitor LLL12B suppresses disease progression



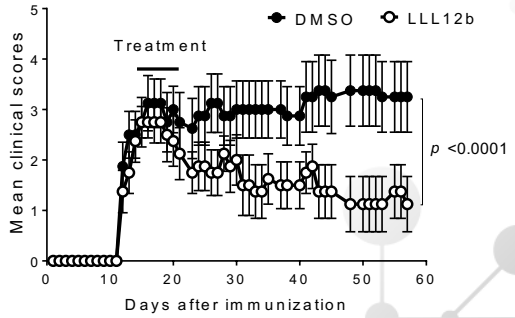
LLL-12B

We developed a novel, small molecule inhibitor of STAT3, called LLL12b, We show that LLL12b significantly suppresses the disease progression in three murine MS model.

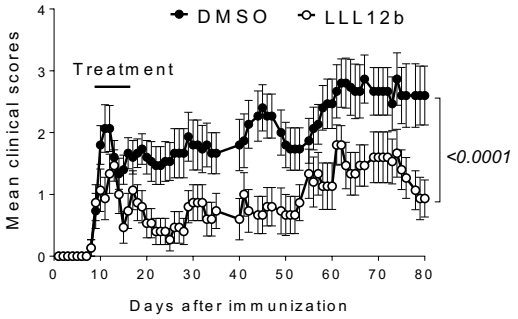
Adoptive transfer

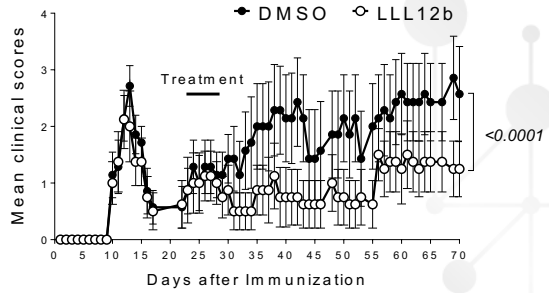


Chronic disease



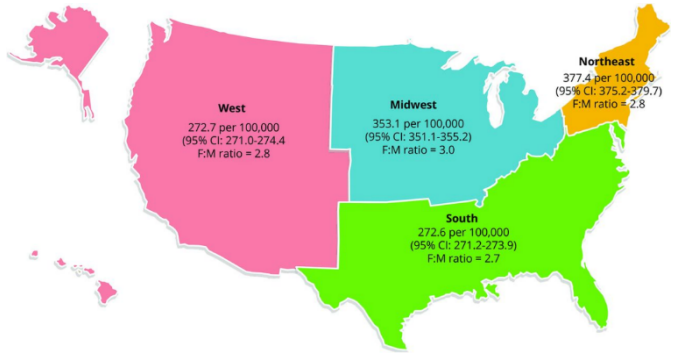
Relapsing-Remitting (RR)

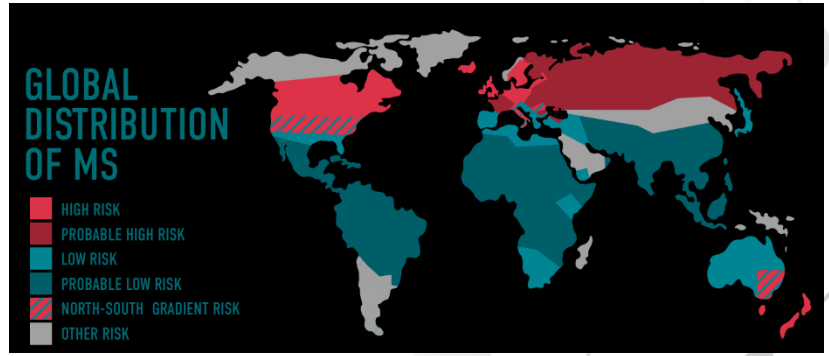


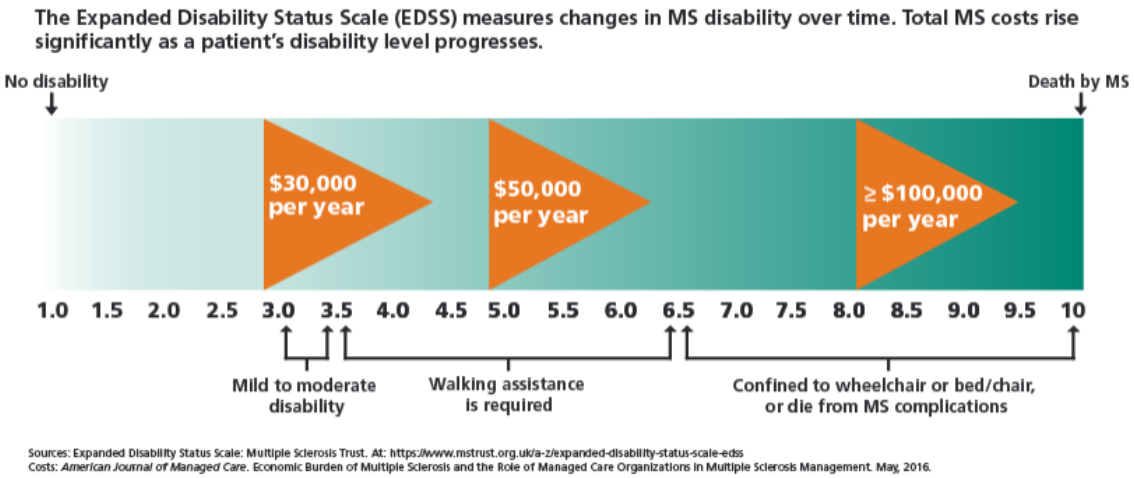


OPPORTUNITY/MARKET

- Prevalence around 300 per 100,000 in U.S.
- Onset: 20-40 year old
- Usually have a normal life span
- 30-40 years on disease-modifying therapies (DMTs)
- Cost to treat is extremely high: Ranked eighth by drug invoice in US
- $19 billion in drug spending, MS is ranked 8th by drug invoice spending among top therapeutic classes
- MS is more common among people in Europe, U.S., Canada, New Zealand, and sections of Australia
- Less common among people in Asia and the tropics







DEVELOPMENT STAGE/NEXT STEPS

- IND enabling
- Clinical trials