Internship POL 2020

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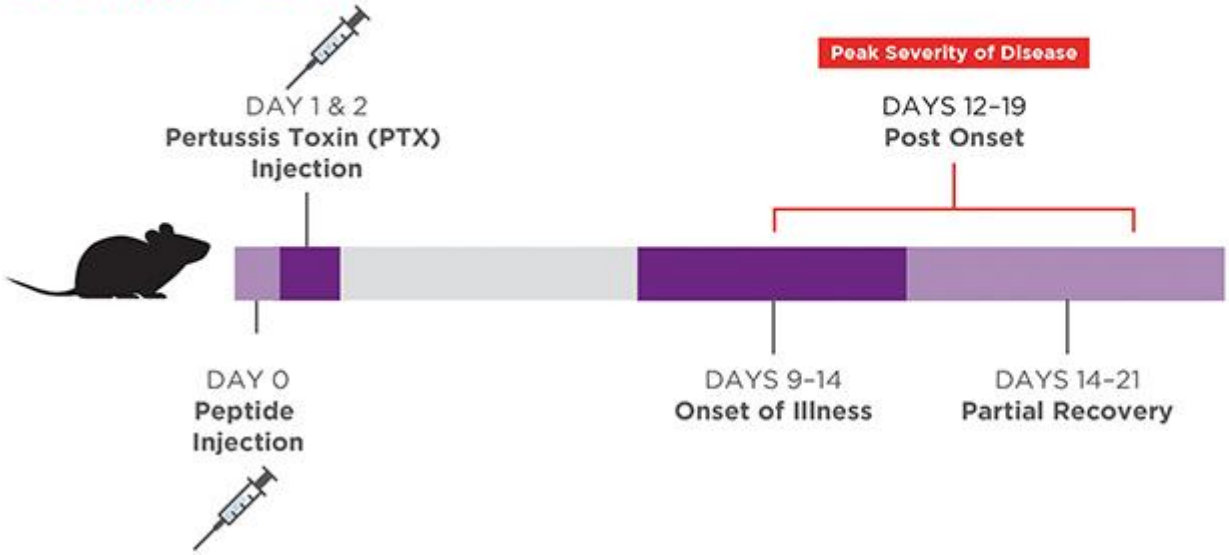
Multiple Sclerosis

- Neurodegenerative disease that severs the connection between the brain and body
- Attacks the nerves in a process called demyelination
- Patients can either live symptom free for most of their life or have severe symptoms that do not go away
- It is rare, with fewer than 200,000 cases in the US per year

EAE Model Timeline

Chronic EAE Model

B6 + MOG + CFA



Only 20–30% of B6 will typically show relapsing and remitting disease, SJL mice are more appropriate for relapsing/remitting studies whereas B6 mice make a better chronic model.

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Scoring Chart

Mouse EAE scoring – onset and peak

Score	Clinical observations
0.0	No obvious changes in motor function compared to non-immunized mice. When picked up by base of tail, the tail has tension and is erect. Hind legs are usually spread apart. When the mouse is walking, there is no gait or head tilting.
0.5	Tip of tail is limp. When picked up by base of tail, the tail has tension except for the tip. Muscle straining is felt in the tail, while the tail continues to move.
1.0	Limp tail. When picked up by base of tail, instead of being erect, the whole tail drapes over finger. Hind legs are usually spread apart. No signs of tail movement are observed.
1.5	Limp tail and hind leg inhibition. When picked up by base of tail, the whole tail drapes over finger. When the mouse is dropped on a wire rack, at least one hind leg falls through consistently. Walking is very slightly wobbly.
2.0	Limp tail and weakness of hind legs. When picked up by base of tail, the legs are not spread apart, but held closer together. When the mouse is observed walking, it has a clearly apparent wobbly walk. One foot may have toes dragging, but the other leg has no apparent inhibitions of movement. - OR - Mouse appears to be at score 0.0, but there are obvious signs of head tilting when the walk is observed. The balance is poor.
2.5	Limp tail and dragging of hind legs. Both hind legs have some movement, but both are dragging at the feet (mouse trips on

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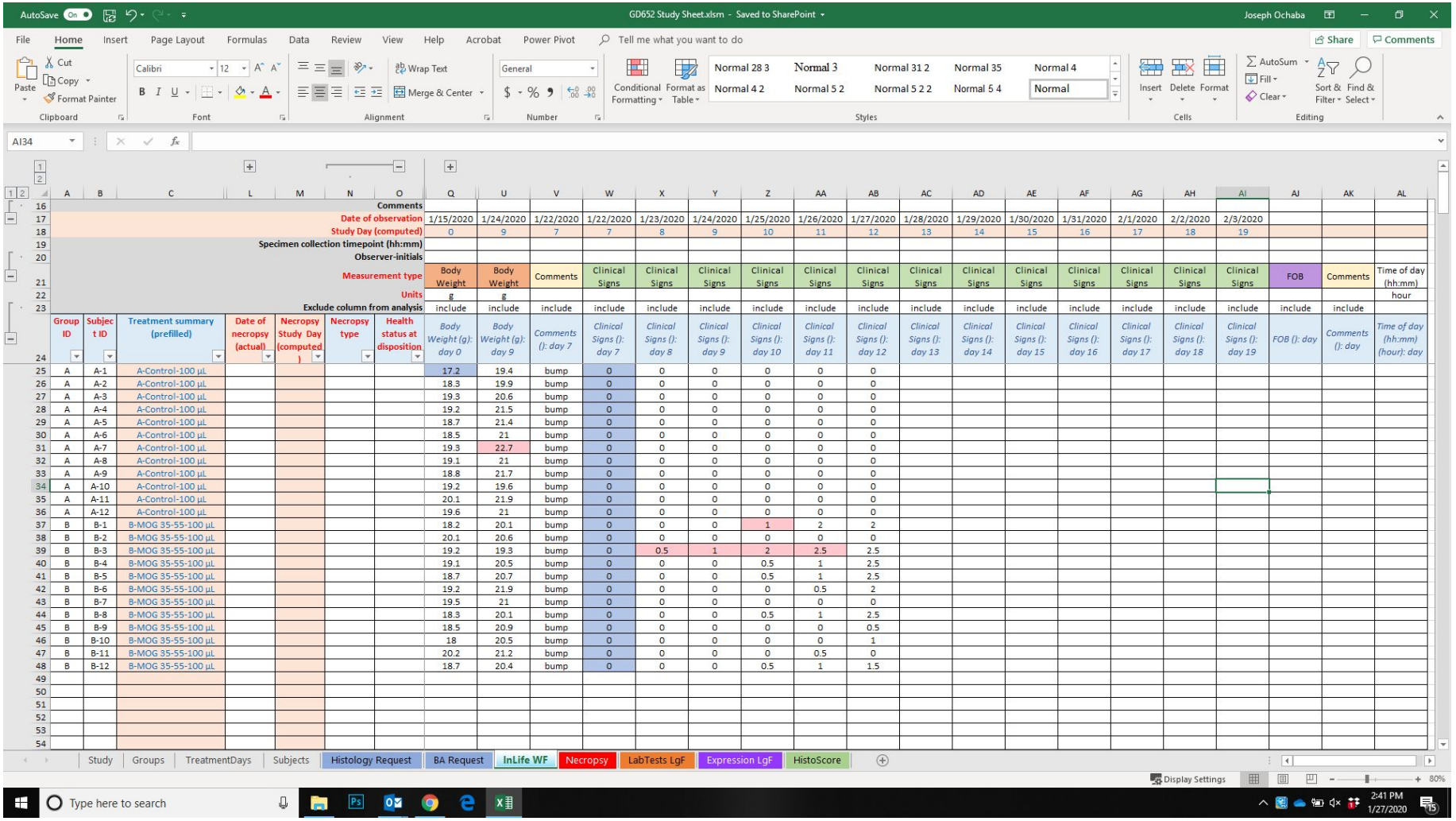

	A	B	C	L	M	N	O	Q	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL
16			Comments																							
17			Date of observation					1/15/2020	1/24/2020	1/22/2020	1/22/2020	1/23/2020	1/24/2020	1/25/2020	1/26/2020	1/27/2020	1/28/2020	1/29/2020	1/30/2020	1/31/2020	2/1/2020	2/2/2020	2/3/2020			
18			Study Day (computed)					0	9	7	7	8	9	10	11	12	13	14	15	16	17	18	19			
19			Specimen collection timepoint (hh:mm)																							
20			Observer-initials																							
21			Measurement type					Body Weight	Body Weight	Comments	Clinical Signs	Clinical Signs	Clinical Signs	Clinical Signs	Clinical Signs	Clinical Signs	Clinical Signs	Clinical Signs	Clinical Signs	Clinical Signs	Clinical Signs	Clinical Signs	Clinical Signs	FOB	Comments	Time of day (hh:mm)
22			Units					g	g																	hour
23			Exclude column from analysis					include	include	include	include	include	include	include	include	include	include	include	include	include	include	include	include	include	include	
24	Group ID	Subject ID	Treatment summary (prefilled)	Date of necropsy (actual)	Necropsy Study Day (computed)	Necropsy type	Health status at disposition	Body Weight (g): day 0	Body Weight (g): day 9	Comments (): day 7	Clinical Signs (): day 7	Clinical Signs (): day 8	Clinical Signs (): day 9	Clinical Signs (): day 10	Clinical Signs (): day 11	Clinical Signs (): day 12	Clinical Signs (): day 13	Clinical Signs (): day 14	Clinical Signs (): day 15	Clinical Signs (): day 16	Clinical Signs (): day 17	Clinical Signs (): day 18	Clinical Signs (): day 19	FOB (): day	Comments (): day	Time of day (hh:mm) (hour): day
25	A	A-1	A-Control-100 µL					17.2	19.4	bump	0	0	0	0	0	0										
26	A	A-2	A-Control-100 µL					18.3	19.9	bump	0	0	0	0	0	0										
27	A	A-3	A-Control-100 µL					19.3	20.6	bump	0	0	0	0	0	0										
28	A	A-4	A-Control-100 µL					19.2	21.5	bump	0	0	0	0	0	0										
29	A	A-5	A-Control-100 µL					18.7	21.4	bump	0	0	0	0	0	0										
30	A	A-6	A-Control-100 µL					18.5	21	bump	0	0	0	0	0	0										
31	A	A-7	A-Control-100 µL					19.3	22.7	bump	0	0	0	0	0	0										
32	A	A-8	A-Control-100 µL					19.1	21	bump	0	0	0	0	0	0										
33	A	A-9	A-Control-100 µL					18.8	21.7	bump	0	0	0	0	0	0										
34	A	A-10	A-Control-100 µL					19.2	19.6	bump	0	0	0	0	0	0										
35	A	A-11	A-Control-100 µL					20.1	21.9	bump	0	0	0	0	0	0										
36	A	A-12	A-Control-100 µL					19.6	21	bump	0	0	0	0	0	0										
37	B	B-1	B-MOG 35-55-100 µL					18.2	20.1	bump	0	0	0	1	2	2										
38	B	B-2	B-MOG 35-55-100 µL					20.1	20.6	bump	0	0	0	0	0	0										
39	B	B-3	B-MOG 35-55-100 µL					19.2	19.3	bump	0	0.5	1	2	2.5	2.5										
40	B	B-4	B-MOG 35-55-100 µL					19.1	20.5	bump	0	0	0	0.5	1	2.5										
41	B	B-5	B-MOG 35-55-100 µL					18.7	20.7	bump	0	0	0	0.5	1	2.5										
42	B	B-6	B-MOG 35-55-100 µL					19.2	21.9	bump	0	0	0	0	0.5	2										
43	B	B-7	B-MOG 35-55-100 µL					19.5	21	bump	0	0	0	0	0	0										
44	B	B-8	B-MOG 35-55-100 µL					18.3	20.1	bump	0	0	0	0.5	1	2.5										
45	B	B-9	B-MOG 35-55-100 µL					18.5	20.9	bump	0	0	0	0	0	0.5										
46	B	B-10	B-MOG 35-55-100 µL					18	20.5	bump	0	0	0	0	0	1										
47	B	B-11	B-MOG 35-55-100 µL					20.2	21.2	bump	0	0	0	0	0.5	0										
48	B	B-12	B-MOG 35-55-100 µL					18.7	20.4	bump	0	0	0	0.5	1	1.5										
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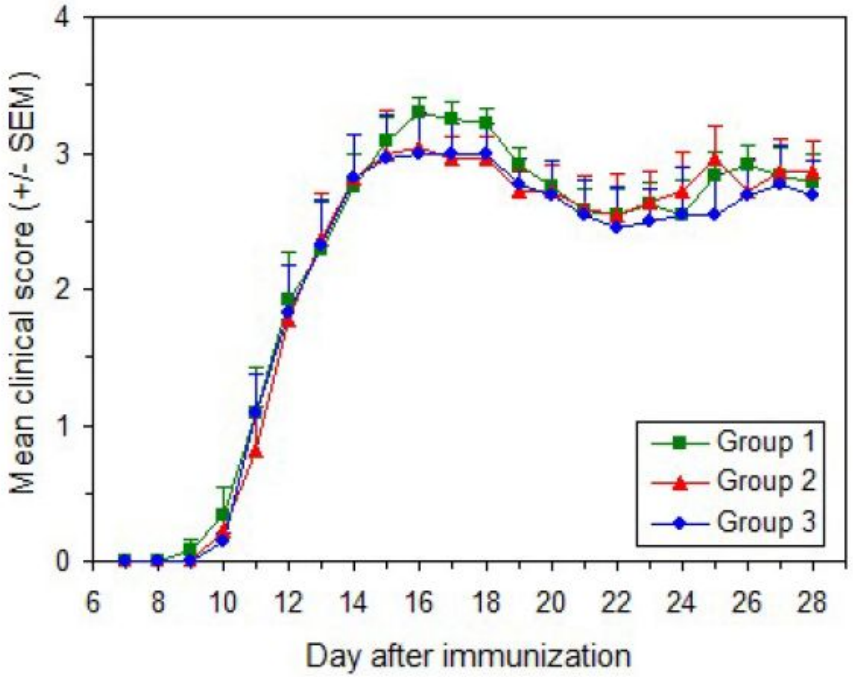
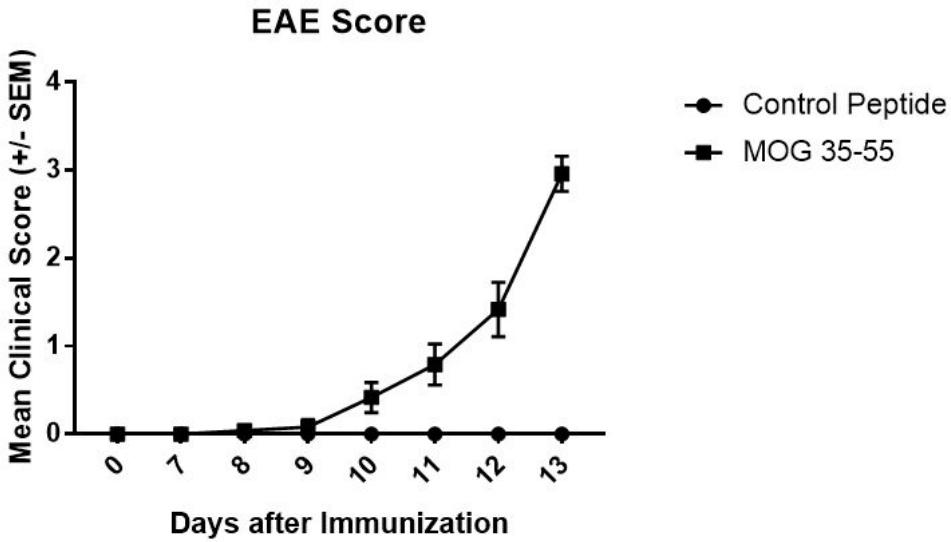
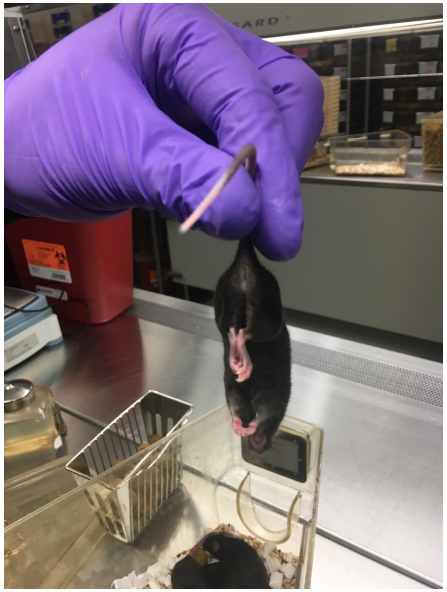
EAE Protocol vs. Our Graph

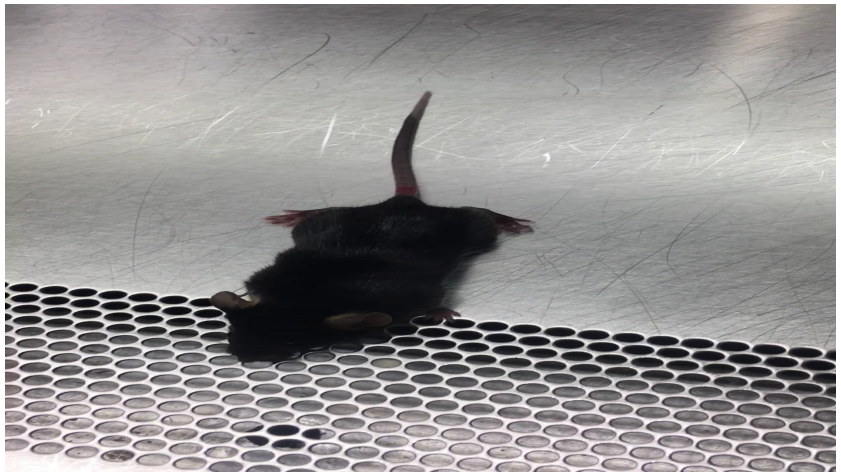
Figure 6 - Typical results





Control Mice vs. Experimental Mice





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How internship affected my plans for the future

- Reinforced previous idea of pursuing bioengineering
- Gained invaluable experience doing research and working in a lab on real-world issues
- I now know I want to do research in college with peers/faculty
- Acquired skills and knowledge that can be applied to various science fields, and biology in particular

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The End

Questions?