



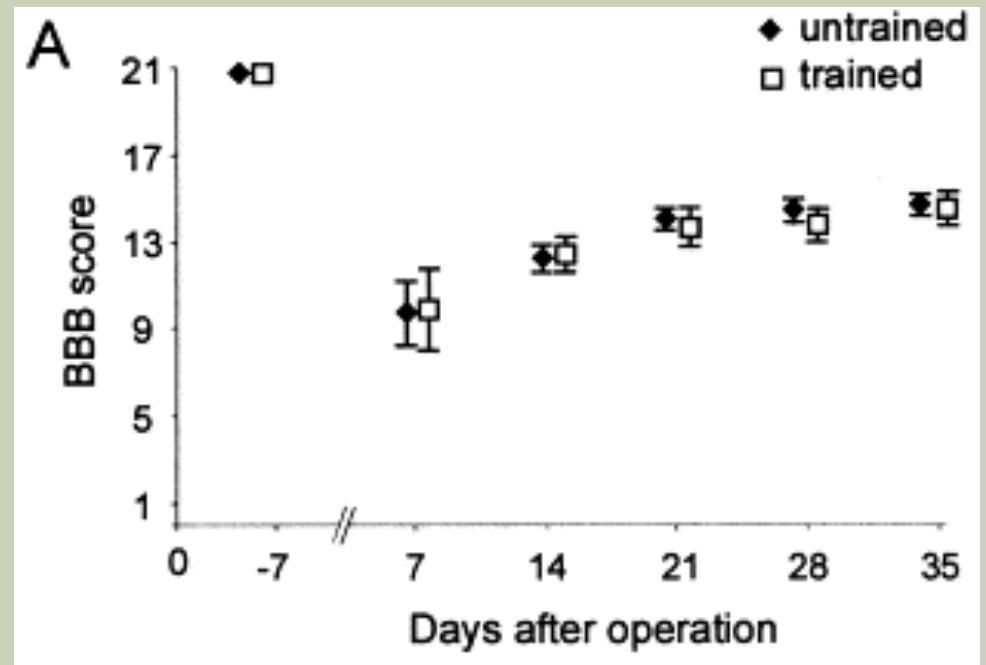
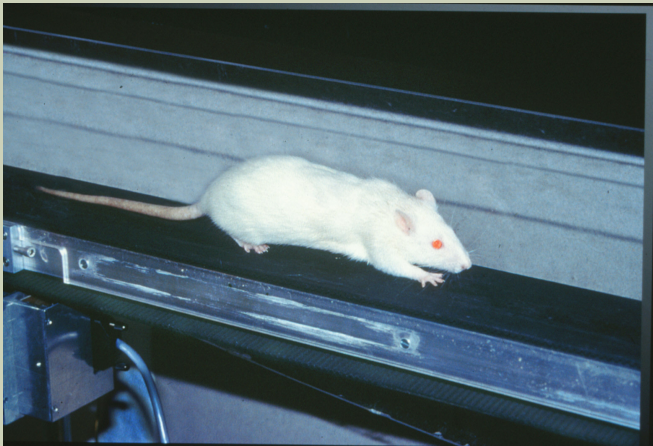
**UNIVERSITY
OF ALBERTA**

LESSONS LEARNED REGARDING MOTOR TRAINING AFTER SCI IN ANIMAL MODELS

Faculty of Rehabilitation
Medicine

Department of Physical
Therapy

20 MIN OF DAILY TRAINING



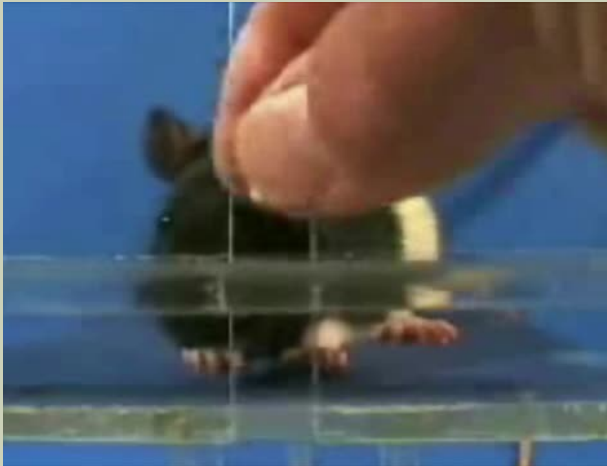
Fouad et al., 2000,
Behav Brain Res

LESSON 1

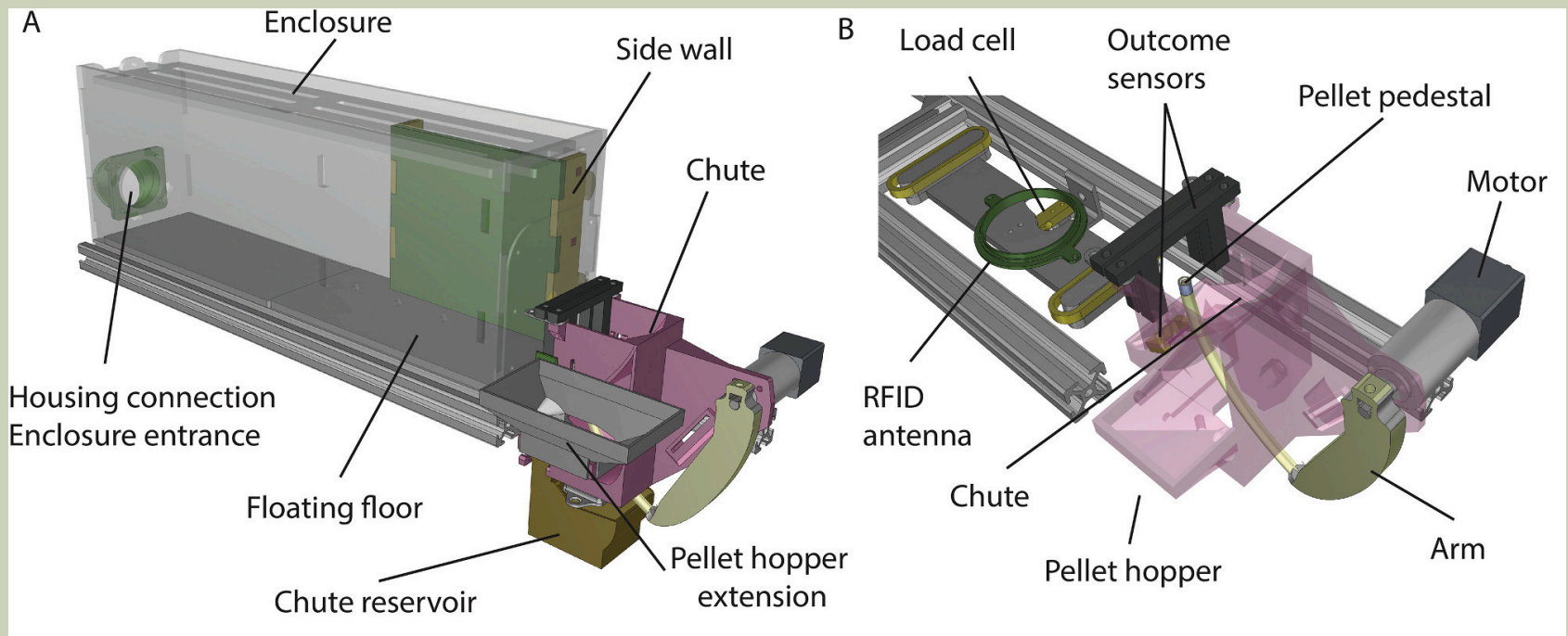
- Spontaneous activity in a similar task counts as training
- Later, DS Magnuson's work confirmed lack of recovery when rats are immobilized

USING A DIFFERENT TASK

- Forelimb reaching for small objects
- Not utilized regularly in home cage
- Dependent on CST integrity



A ROBOTIC HELPER



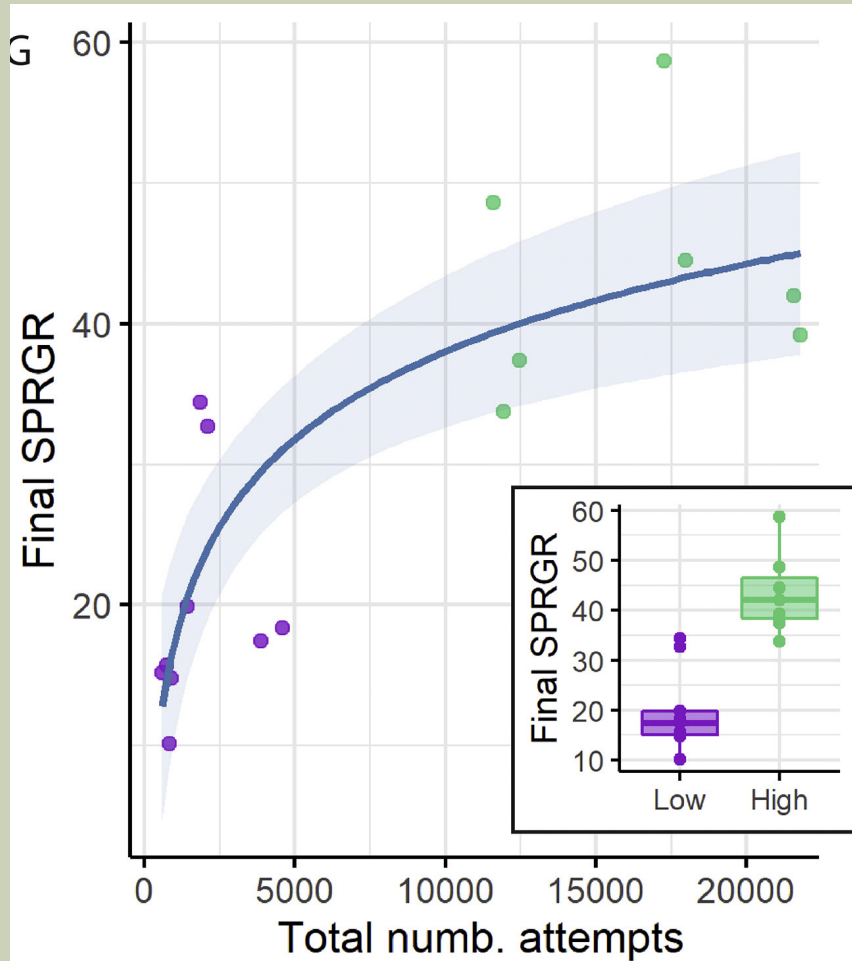
A ROBOTIC HELPER

Enabling supervised and non supervised training

- Self motivated
- Around the clock
- Variability



LESSON 2: TRAINING AMOUNT MATTERS

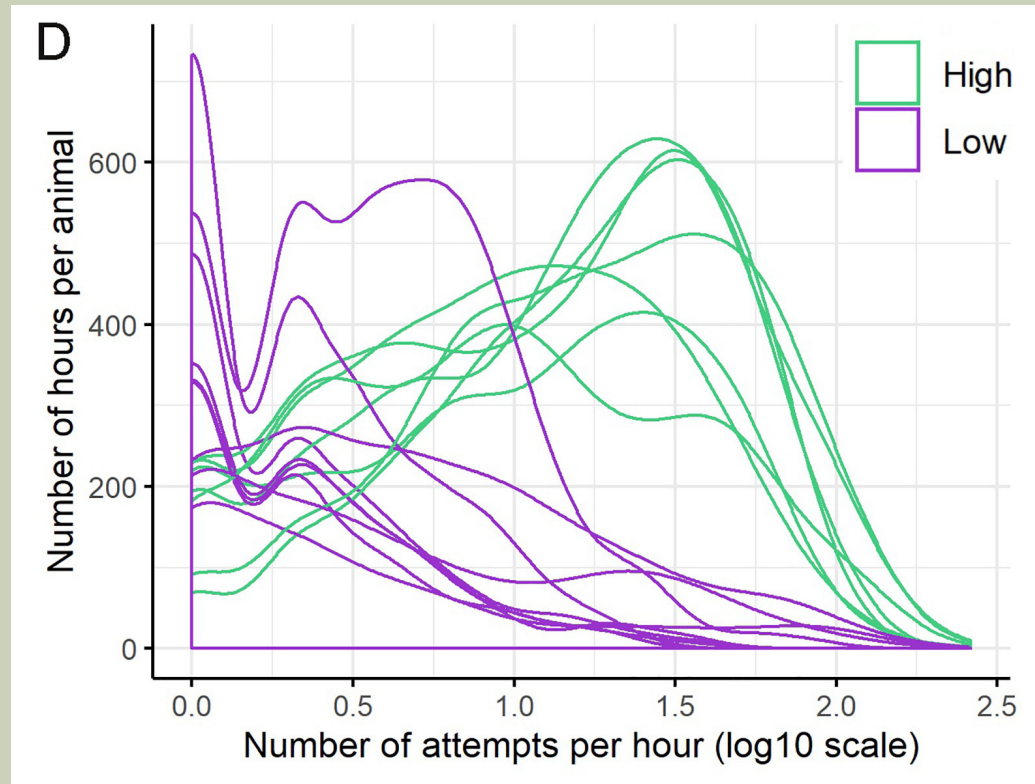


- Cluster analysis detected two groups
- More attempts = better recovery
- Not linear

Fenrich et al. 2021,
Exp neurol

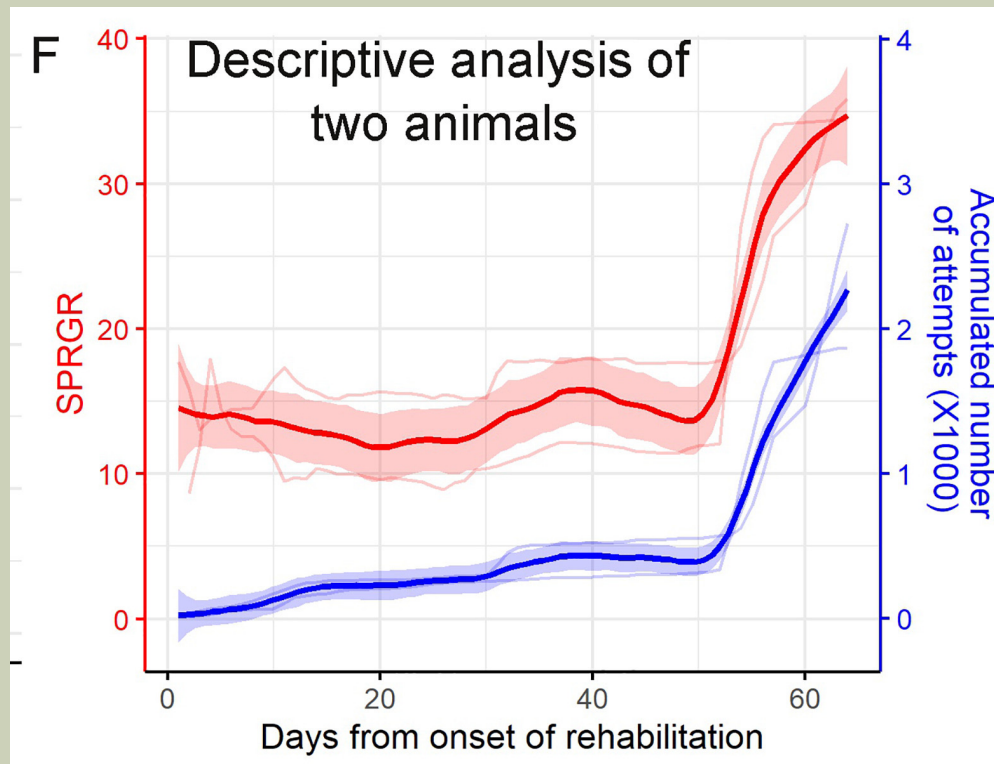
LESSON 3

Training intensity matters



LESSON 4

INTENSITY MATTERS EVEN IN CHRONIC SCI

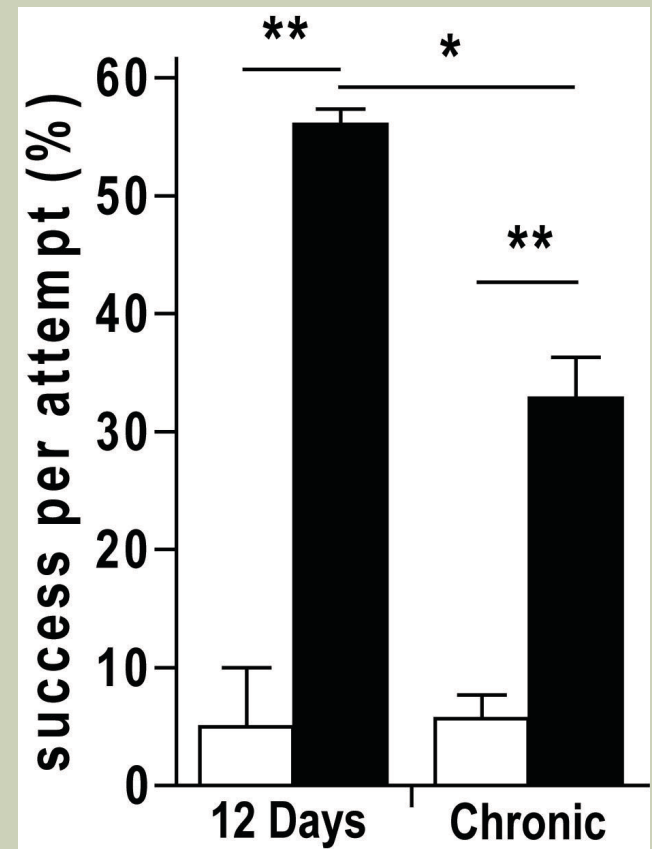


Is training at low intensity a wasted effort?

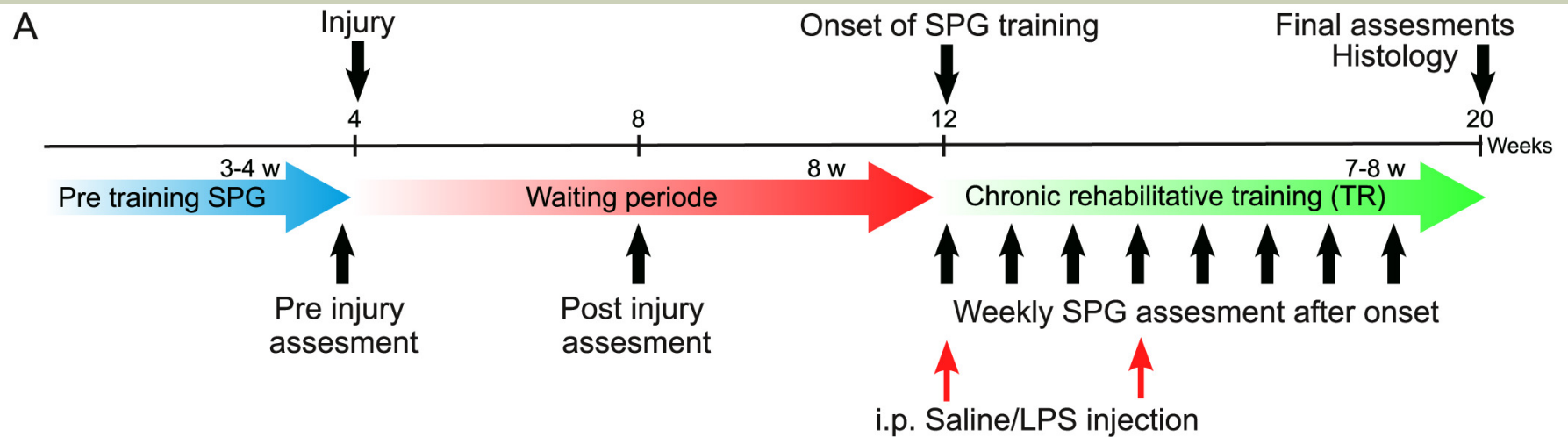
LESSON 5

Training is more effective when applied in a window of opportunity

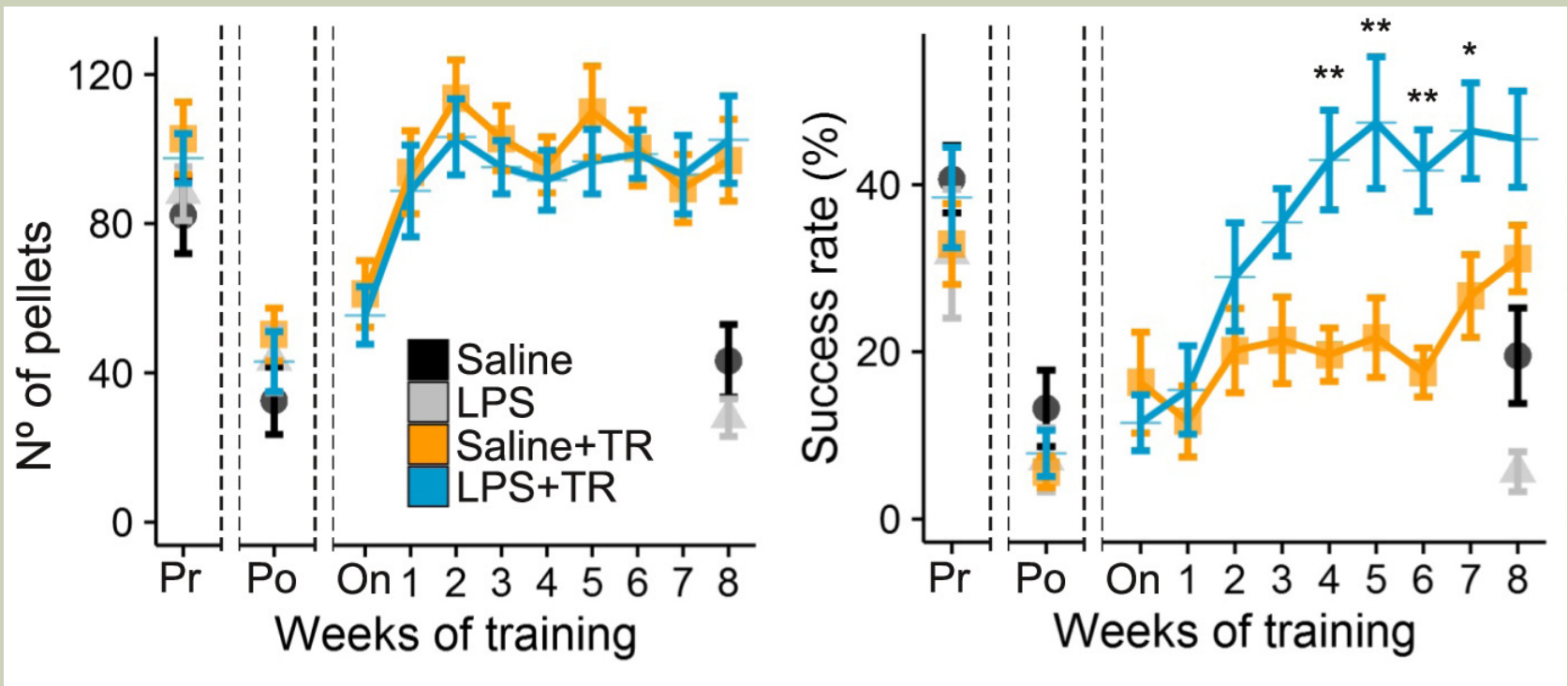
What defines this window and biomarkers is currently explored



DOES INFLAMMATION CONTRIBUTE TO WINDOW OF OPPORTUNITY?

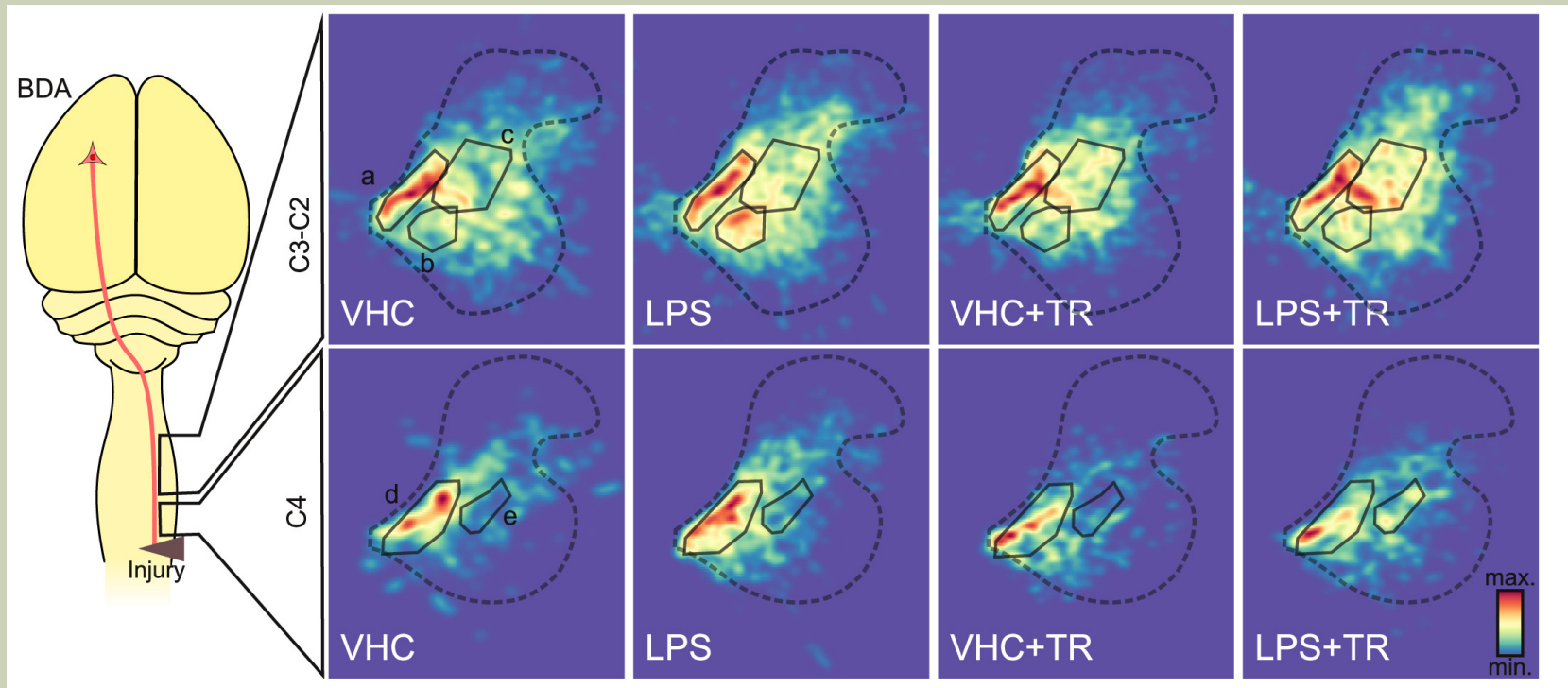


LPS ENHANCES TRAINING EFFICACY

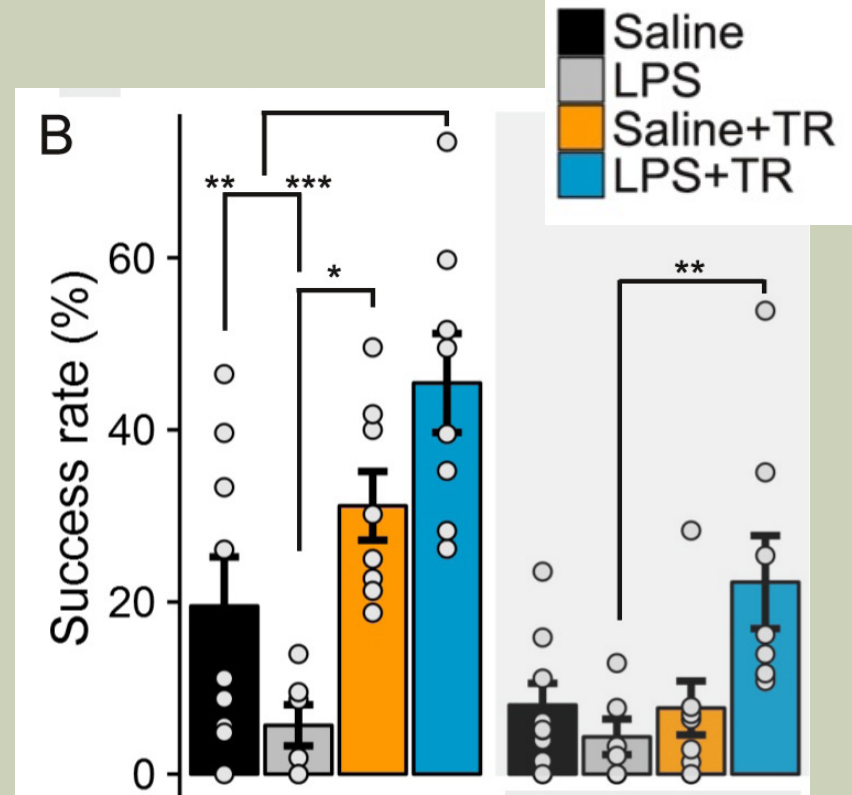
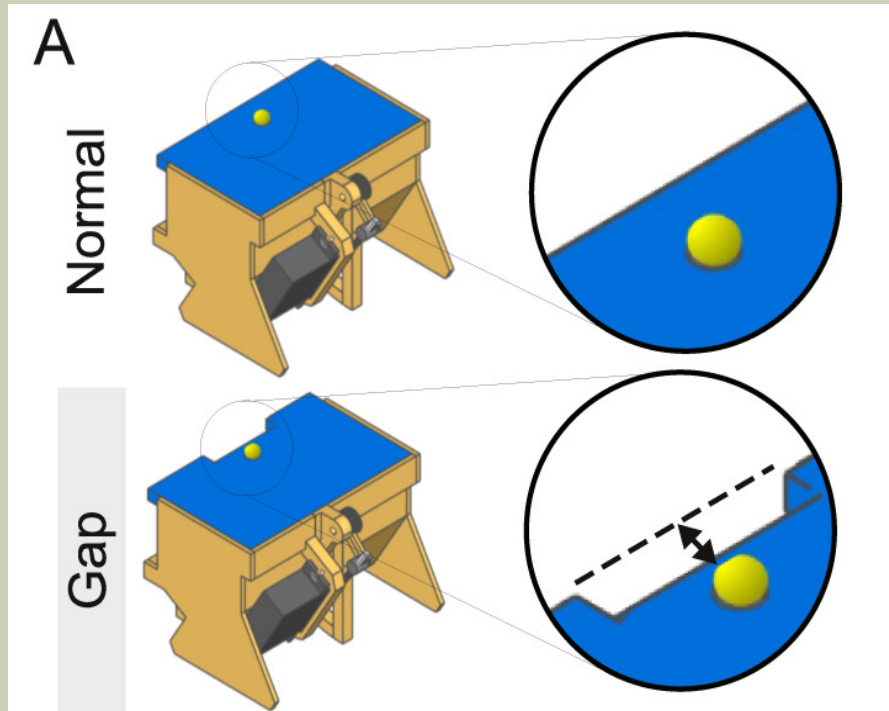


LESSON 6

Training Directs LPS induced plasticity



LESSON 7



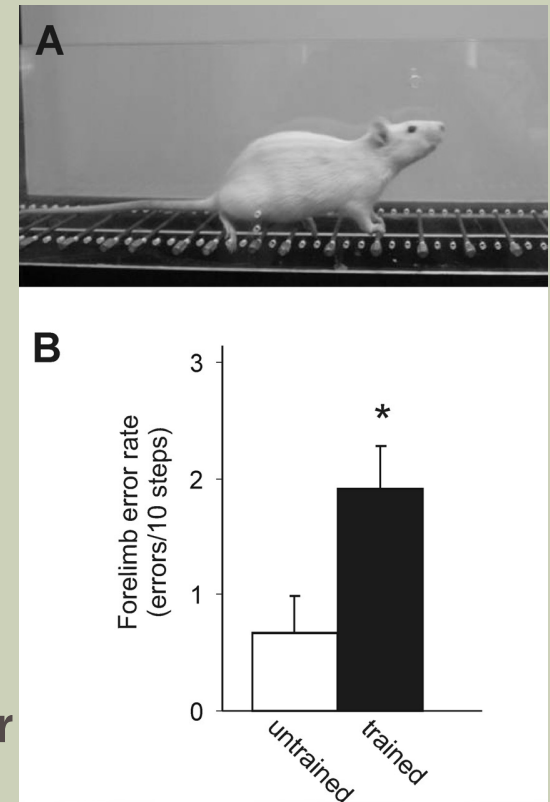
Training can promote recovery by compensatory strategies

TASK SPECIFICITY: NO CLEAR LESSON

- This is a topic with some controversial findings
- Standing versus stepping in cats and man does not translate
- Walking backwards does not translate to walking forward

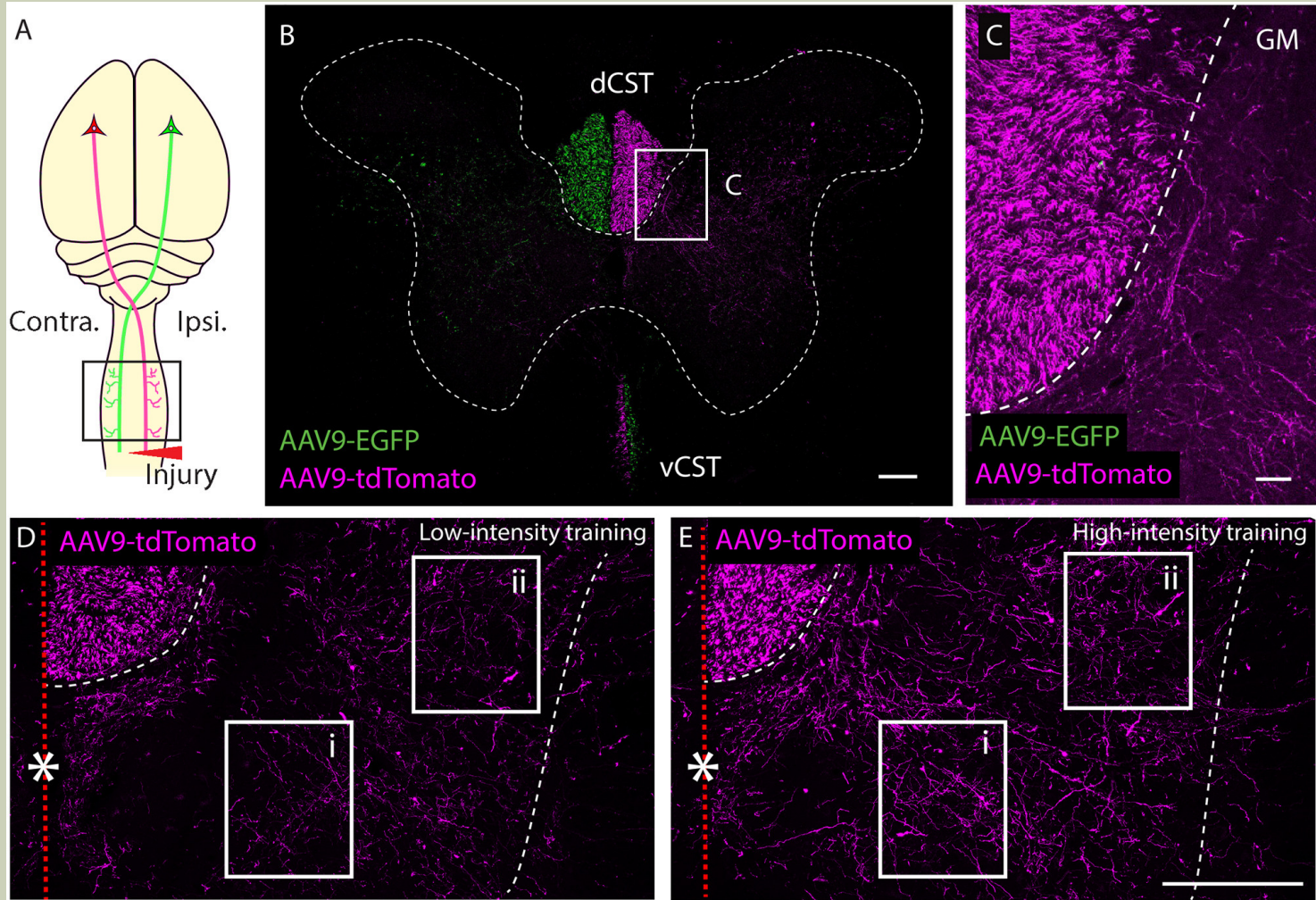
Even the opposite was found

- Training reaching can affect performance in ladder walking
- And then there is Harnei et al 2019 (Elife):
The recovery of standing and locomotion after SCI does not require task-specific training

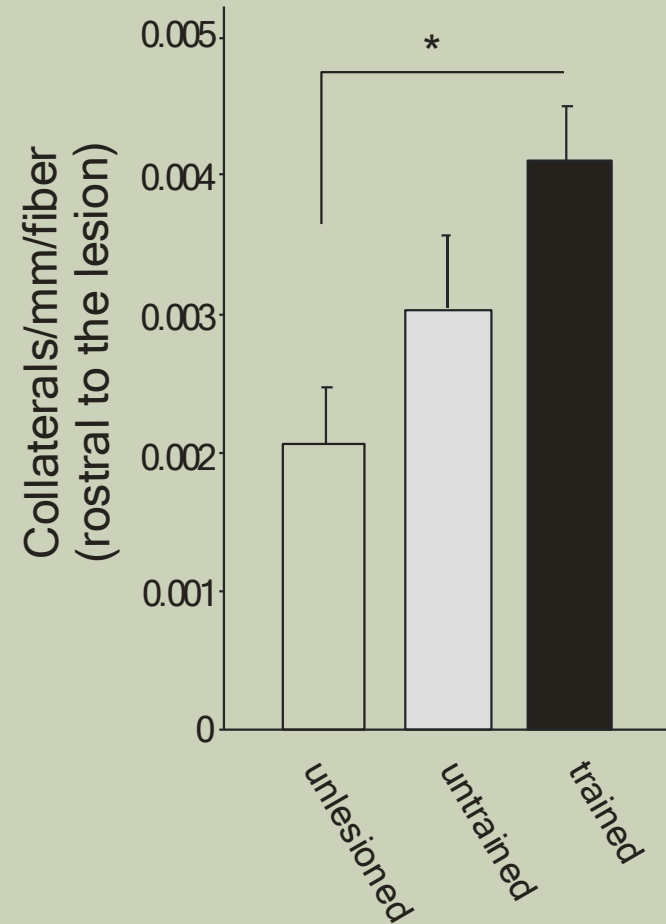
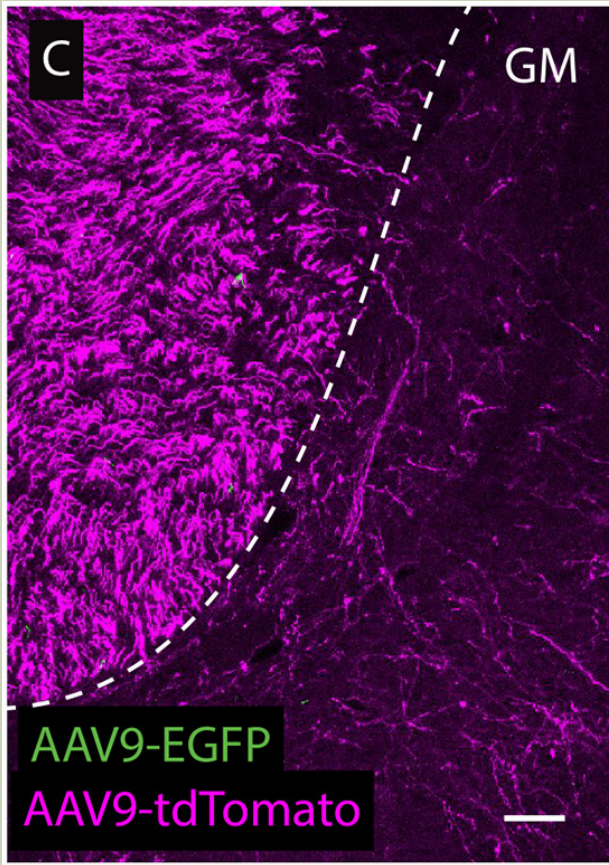


LESSON 8

TRAINING ALONE INCREASES PLASTICITY



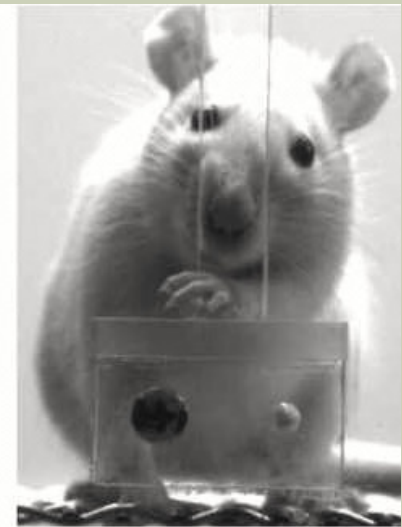
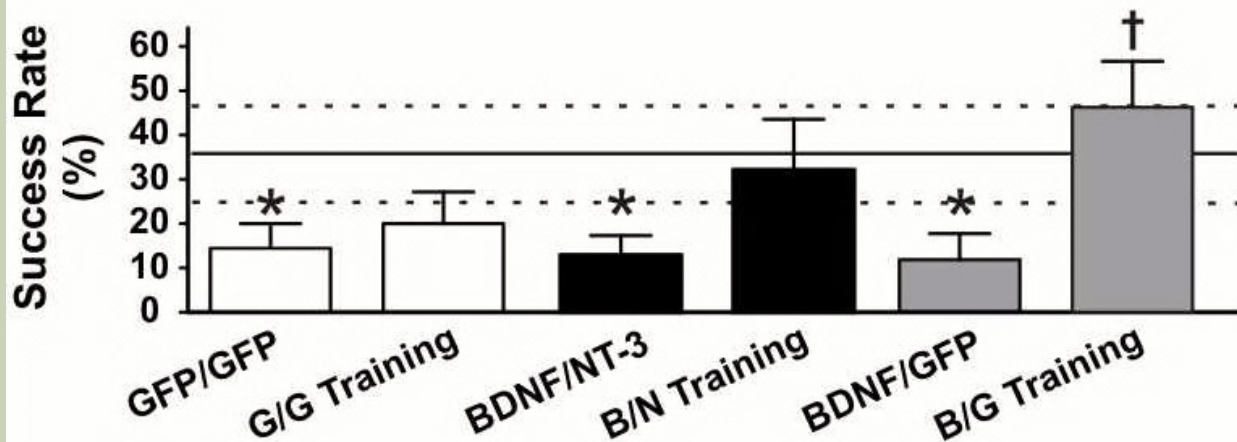
TRAINING AFTER SCI PROMOTES CST SPROUTING



LESSON 9

Promoting neurite outgrowth requires training to promote recovery (see Hubel and Wiesel)

A Single Pellet Reaching



Also see Garica Alias et al, or Torres Espin et al

CONSEQUENCES OF LESSON 6,8 & 9

Interventions may trigger inflammation ...

Inflammation in chronic and subacute injury

Plus rehabilitative training ...

