



## 2026 NEW YORK REGIONAL SOCIETY OF PLASTIC SURGEONS ANNUAL RESIDENTS' NIGHT RESEARCH COMPETITION

MONDAY, APRIL 20, 2026

NEW YORK ACADEMY OF MEDICINE

**ABSTRACT SUBMISSION TITLE:** *C2 - Poorly controlled diabetes is associated with decreased neuroma pain following peripheral nerve transection in a rat neuroma model*

**Additional Author(s):**

*Edward Lee, MD*

**Abstract Presenting Author:**

*Tiam M. Saffari, MD, PhD*

**Plastic Surgery Residency Training Program:**

*Rutgers Health/New Jersey Medical School Program*

**Abstract Text:**

**PURPOSE:**

Diabetes mellitus (DM) accounts for approximately 80% of non-traumatic lower limb amputations, with up to 30% of amputees develop symptomatic neuromas. Targeted muscle reinnervation (TMR) and regenerative peripheral nerve interface (RPNI) are effective strategies for neuroma prevention, however, increase operative complexity. Literature suggests that DM is associated with impaired nerve regeneration and may attenuate symptomatic neuroma pain following nerve transection. The aim of this study was to evaluate the effect of poorly controlled diabetes with persistent hyperglycemia on neuroma-associated pain in a validated rat neuroma model.

**METHODS:**

Male and female BB-Wistar rats (N=12/group; 6 male and 6 female/group) aged 180 days were used. In all rats, a neuroma of the tibial nerve was surgically created. In short, the tibial nerve was transected proximal to the knee, transposed, and secured to the dermis of the thigh, and the site was marked on the skin surface. Diabetic animals

underwent glucose monitoring and were maintained at a high glycemic range, between 300-450 mg/dL. Baseline behavioral testing was performed prior to surgery, followed by weekly assessments for 12 weeks. Outcomes included thigh tap testing, von Frey testing, Hargreaves thermal nociception, and cold allodynia. At 12 weeks, animals were sacrificed and L4-L5 dorsal root ganglia (DRG) were harvested for immunohistochemical analysis of neuropeptide Y (NPY), a marker for nerve injury-associated pain. Behavioral data was analyzed using a Welch T-test and DRG NPY expression was compared using a Mann-Whitney U test.

#### RESULTS:

Thigh tap testing demonstrated significantly lower pain responses in diabetic animals ( $p < 0.0001$ ), with differences between groups observed at postoperative week 9-12. Von Frey testing demonstrated higher withdrawal thresholds in diabetic animals ( $p < 0.0001$ ), starting week 5. Cold allodynia and Hargreaves thermal responses were significantly lower in diabetic animals compared to wild-type animals ( $p < 0.05$ ). DRG NPY expression was significantly lower in diabetic animals ( $p = 0.001$ ).

#### CONCLUSIONS:

Poorly controlled diabetic rats with persistent hyperglycemia are associated with a significant attenuation of neuroma-associated pain behavior. The decrease in DRG NPY expression found in diabetic animals suggests a reduced neuronal activation following injury leading to a reduced likelihood of symptomatic neuroma formation. These findings suggest that a hyperglycemic micro-environment may modify neuroma pain biology and may therefore impact patient selection for prophylactic nerve-directed interventions. Future studies are needed to evaluate the efficacy of TMR and RPNI in diabetic rat models to determine whether glycemic control alters neuroma pain outcomes after these interventions.

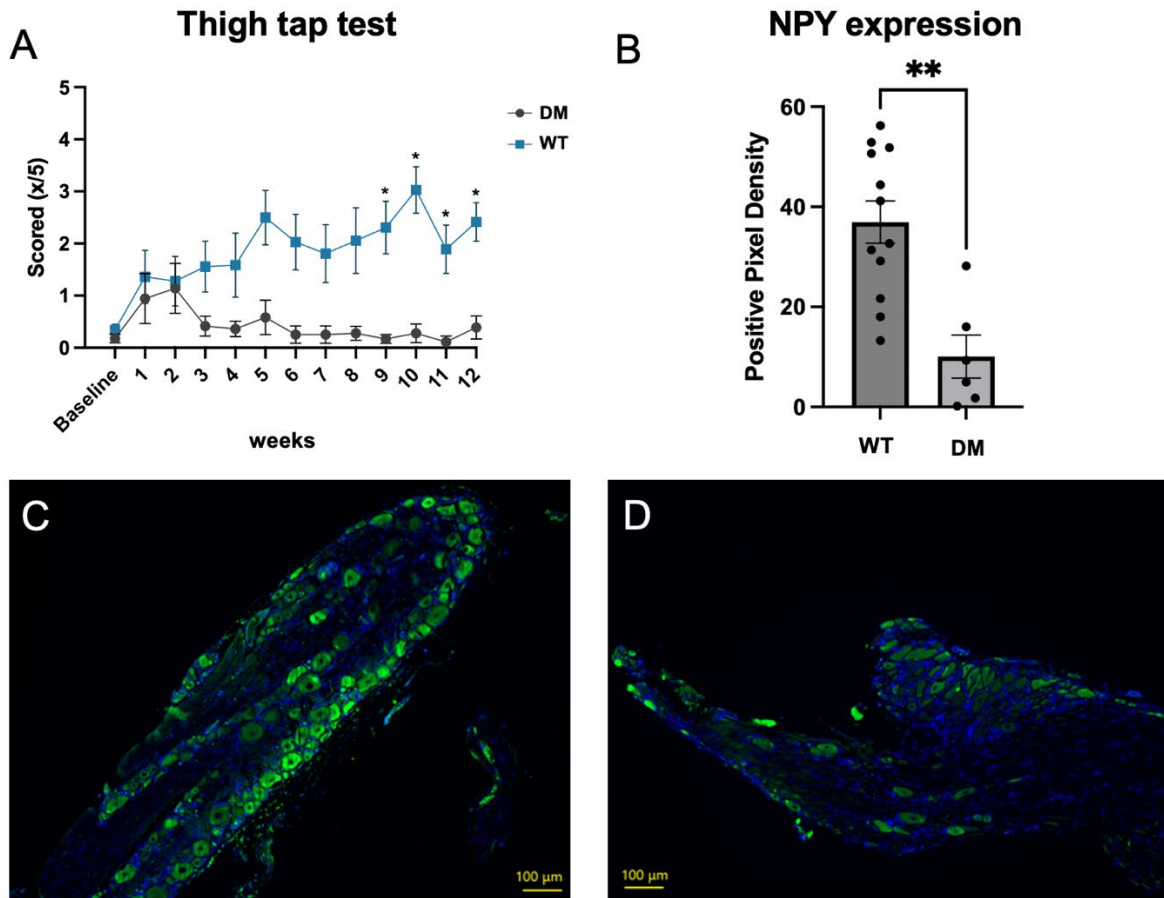


Figure 1A: Thigh tap tests performed weekly for 12 weeks. Baseline tests were performed at week 0. Wild type (WT) and diabetic (DM) rats underwent neuroma surgery at week 1. 1B: Quantification of pixel density of Neuropeptide Y (NPY) in WT and DM dorsal root ganglia (DRG). Immunohistochemistry labeling of NPY in green and DAPI in blue in neuroma (1C) and non-operated control (1D).