May 4th, 12:00 AM

# Maackia amurensis Seed Lectin (MASL) Increases Movement Velocity of Mice with TNFα Induced Rheumatoid Arthritis

Amanda A. Greenspan
*Medstar Georgetown University Hospital*

Kelly L. Hamilton
*Rowan University*

Alan J. Shienbaum
*Pathology Associates, Keystone, PA*

Bradford Fischer
*Rowan University*

Andrea Bottaro
*Rowan University*

# *Maackia amurensis* Seed Lectin (MASL) Increases Movement Velocity of Mice with TNFα Induced Rheumatoid Arthritis

Amanda A. Greenspan[2], Kelly L. Hamilton[1], Alan J. Shienbaum[3], Bradford Fischer[4], Andrea Bottaro[4], and Gary S. Goldberg[2]

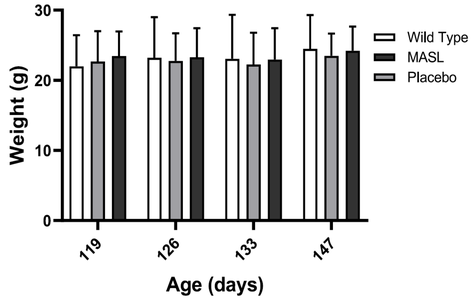
[1]Rowan University SOM & GSBS, Stratford, NJ.[2] Medstar Georgetown University Hospital, Washington, DC.[3] Pathology Associates, Keystone, PA.[4] Cooper Medical School of Rowan University, Camdem, NJ.

Up to 70 million people around the world suffer from rheumatoid arthritis. Current treatment options have varied efficacy and can cause unwanted side effects. New approaches are needed to treat this condition. Sialic acid modifications on chondrocyte receptors have been associated with arthritic inflammation and joint destruction. The transmembrane mucin receptor protein podoplanin (PDPN) has been identified as a functionally relevant receptor that presents extracellular sialic acid motifs. PDPN signaling promotes inflammation and invasion associated with arthritis and, therefore, has emerged as a target that can be used to inhibit arthritic inflammation. *Maackia amurensis* seed lectin (MASL) can target PDPN on chondrocytes to decrease inflammatory signaling cascades and reduce cartilage destruction in a lipopolysaccharide induced osteoarthritis mouse model. Here, we investigated the effects of MASL on rheumatoid arthritis progression in a TNFα transgenic (TNF-Tg) mouse model. Results from this study indicate that MASL can be administered orally to ameliorate joint malformation and increase velocity of movement exhibited by these TNF-Tg mice. These data support the consideration of MASL as a potential treatment for rheumatoid arthritis.

## Joint malformation in TNFα transgenic mice

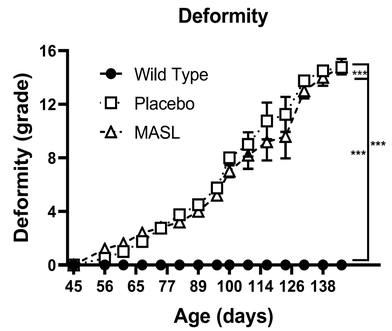

Wild type and TNF-Tg mice were maintained for 147 days, and rear paws were photographed as indicated (bar = 1 cm).

## MASL does not affect mouse weight



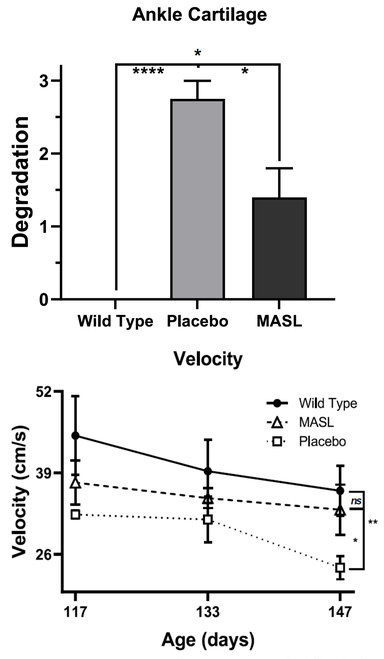

Wild type and TNF-Tg mice were maintained 45 days before MASL (100 mg/kg) or placebo were orally administered to TNF-Tg mice 3 days per week. Weight was measured at indicated time points (mean±SEM).

## MASL delays TNF-Tg mice joint deformity



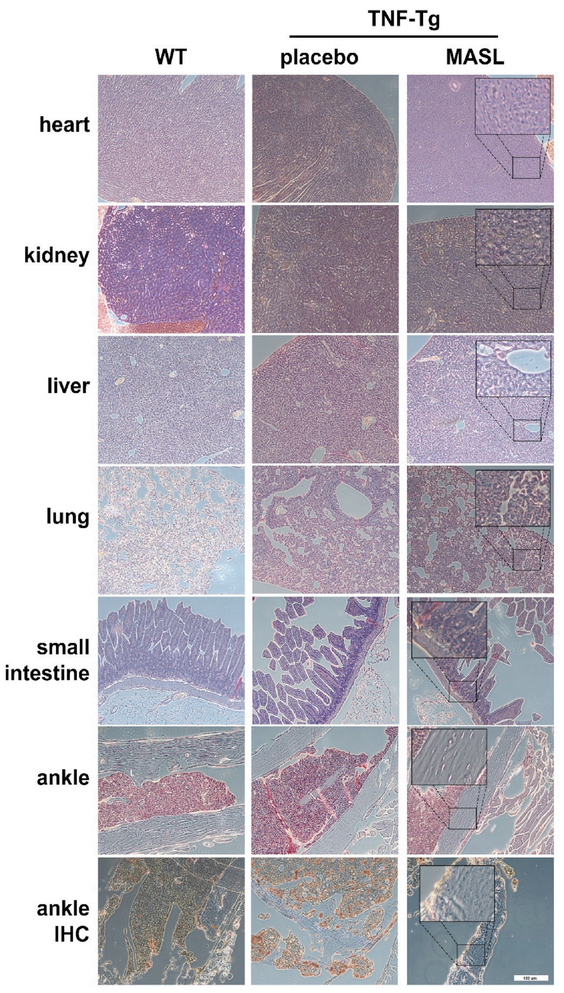

Wild type and TNF-Tg mice were maintained for 45 days before MASL (100 mg/kg) or placebo was orally administered to TNF-Tg mice 3 days per week. Joint deformity was measured on a scale of 0–16 at the indicated time points. Data are shown as mean ± SEM.

## MASL protects TNF-Tg ankle cartilage and augments mouse movement




Wild type and TNF-Tg mice were maintained 45 days before MASL (100 mg/kg) or placebo was orally administered to TNF-Tg mice 3 days per week for 15 weeks before animals were sacrificed. Velocity was measured as cm traveled per second during movement at indicated time points. Ankles were examined by H&E staining and cartilage destruction was graded on a scale of 0–4. Data are shown as mean ± SEM with p<0.0001, <0.01, <0.05, and p>0.05 indicated by quadruple, double, and single asterisks and ns, respectively.

## Tissue morphology in wild type and TNF-Tg mice




Wild type and TNF-Tg mice were maintained 45 days before MASL (100 mg/kg) or placebo was orally administered to TNF-Tg mice 3 days per week for 15 weeks before animals were sacrificed. Heart, kidney, liver, lung, small intestine, and ankles were examined by H&E staining, and PDPN expression in ankle tissue was examined by IHC, as indicated (bar = 130 µm).

## Impact

- MASL decreases TNF induced arthritic morphology.
- MASL increases TNF-Tg mice movement velocity.
- MASL does not disrupt mouse weight, behavior, or tissue morphology.
- MASL decreases TNF induced ankle cartilage destruction.