

**Muscle ultrasound – unlocking the diagnostic potential in evaluating muscle size and composition in relation to diabetic polyneuropathy**

**Aims:** To investigate muscle ultrasound's ability to detect early signs of skeletal muscle wasting and compositional changes of the lower extremity in relation to the presence of diabetic polyneuropathy (DPN) in individuals with type 2 diabetes (T2D).

**Methods:** Ninety individuals with T2D (39 with DPN) were enrolled in this cross-sectional study. Individuals with DPN and without DPN (nDPN) were similar in most of the reported clinical characteristics, including age (nDPN vs DPN: 61 vs 65 years), sex (males, 55 vs 56%), and BMI (24 vs 23 kg/cm<sup>2</sup>). DPN was assessed by the Michigan Neuropathy Screening Instrument and vibration perception thresholds (VPT). Ultrasound images were obtained of rectus femoris (RF), tibialis anterior (TA), and the medial head of gastrocnemius (MG) from both sides of the lower extremity. Measures included muscle thickness (MT), cross-sectional area (CSA), echo intensity (EI), and corrected EI. EI being a measure of muscle composition, with higher EI values indicating a higher proportion of noncontractile tissue, and corrected EI referring to EI adjusted for subcutaneous fat thickness. Binary logistic regression and multiple linear regression were used to assess ultrasound measures' relationship with DPN status and VPT, respectively.

**Results:** Ultrasound measures of EI, corrected EI and MT of MG and EI of TA were associated with DPN after adjusting for clinical variables. EI of MG proved to have the best predictive value of DPN (OR: 1.11, 95% CI: 1.04;1.20).

**Conclusions:** Muscle ultrasound measures of the medial head of gastrocnemius and tibialis anterior were significantly associated with the presence of DPN after adjusting for clinical confounding factors in individuals with T2D. These findings underscore the potential of muscle ultrasound as a tool in assessing early-stage alterations in skeletal muscle size and composition in individuals with DPN.

**Comments.** Muscle failure in individuals with diabetes is an overlooked complication impacting quality of life, risk of falls and fractures, length of in-hospital stays, and overall morbidity and mortality. Lower muscle mass increases the risk of developing DPN, and DPN further accelerates loss of muscle strength and mass. Common bedside assessment of muscle function rely on visual inspection and manual muscle testing; often failing to detect muscle dysfunction before severe limitations in activities of daily living. This is problematic since muscle function can be maintained with proper and timely intervention even in the presence of DPN. In regard to DPN, muscle ultrasound has chiefly been applied and validated for assessment of intrinsic foot muscles in relation to the development of diabetic foot, whereas evidence is lacking for the application of ultrasound on more proximal muscle groups. While the present study has several limitations, including the absence of a healthy control group and muscle strength measures, it provides intriguing evidence on ultrasound's potential to detect early muscular changes at more proximal sites. Further evidence and standardization of the method are still needed, but the study supports the notion that muscle ultrasound may provide a practical, valuable, and time-efficient method assisting neuromuscular evaluation in the clinical and research setting, also when evaluating muscular dysfunction in individuals with DPN.

**Anders Stouge**

**Reference.** Zhong Y, Liu X, Lin T. The Relationship between Muscle Ultrasound Parameters and Diabetic Peripheral Neuropathy among Patients with Type 2 Diabetes Mellitus: A Cross-Sectional Study. *J Diabetes Res.* 2023 Dec 19;2023:8897065. doi: 10.1155/2023/8897065. PMID: 38148834; PMCID: PMC10751167.

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