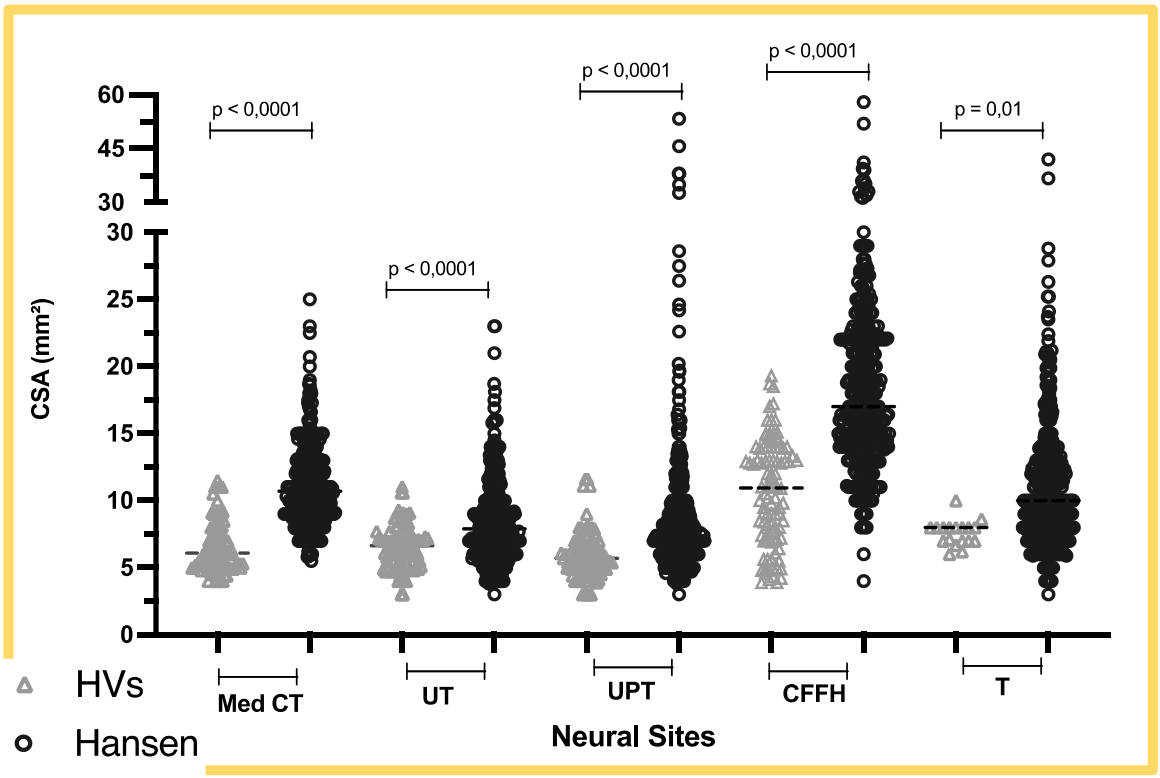
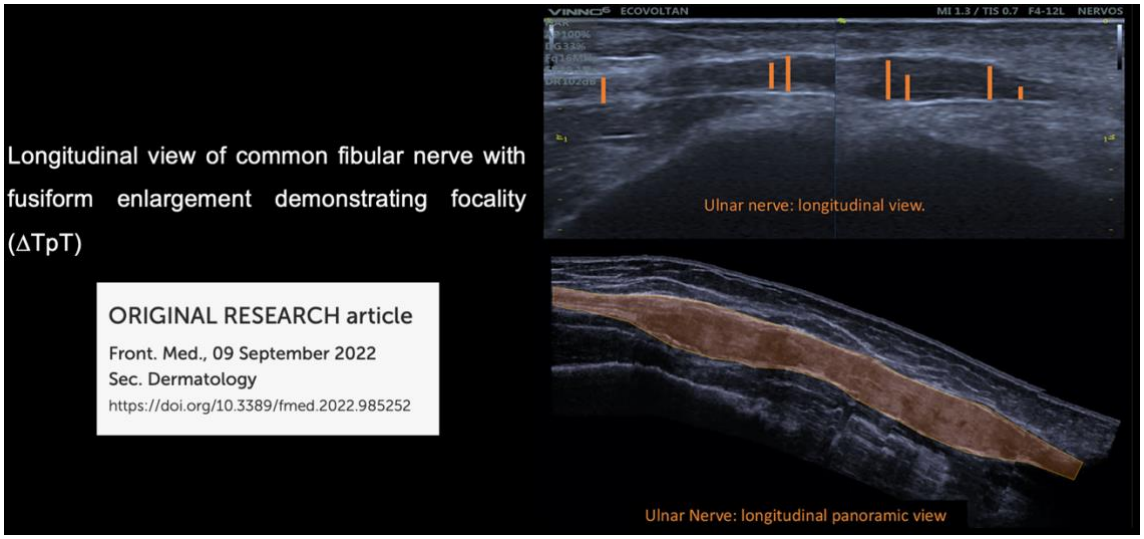
Title: Point-of-care ultrasound of peripheral nerves in the diagnosis of Hansen's disease neuropathy.

Introduction: Hansen's disease (HD) is the most common cause of treatable peripheral neuropathy in the world that may or may not involve skin manifestations, and physical examination based on simplified neurologic evaluation is a subjective and inaccurate procedure. High-resolution ultrasound (HRUS) can be used to evaluate peripheral nerves and is a validated technique of good reproducibility, permitting a detailed and precise examination. **Objectives**: We proposed to establish objective criteria for absolute values of the measurement of the CSA of peripheral nerves and their indices of the ΔCSA and ΔTpT in the diagnosis of Hansen's disease neuropathy as compared with healthy voluntaries. **Materials and methods:** In municipalities from di□erent regions of Brazil, we randomly selected 234 volunteer Brazilian patients diagnosed with leprosy to be submitted to peripheral nerve echography and compared with 49 healthy Brazilian volunteers. **Results**: Hansen Disease assessed by high resolution ultrasound is a primarily neural disease that leads to multiple hypertrophic mononeuropathy characterized by CSA values exceeding normal limits (Med CT = 10.2 mm2; UT = 9.8 mm2; UPT = 9.3 mm2; CFFH = 18.3 mm2; T = 9.6 mm2), and the pattern of asymmetry (1CSA>2.5 mm2 with RR 13) and focality (1TPT > 2.5 mm2 with RR 6.4) of this thickening has higher sensitivity (76,1%) and specificity (87,8 %) for its early diagnosis that laboratory tests. Analyzing each subject, the percentage of thickened nerves detected among the total number of nerves assessed was higher among patients with HD than among healthy individuals ($p < 0.0001$). Individuals with two or more thickened nerves were at 24.1 times higher relative risk (95% CI: 6.74–88.98) of HD. **Conclusions:** HD assessed by HRUS is established as a primary neural disease that leads to multiple hypertrophic mononeuropathy characterized by CSA values exceeding normal limits. An individual with at least two thickened nerves assessed in the active search campaign has a 23.1 greater chance of having leprosy than a healthy individual. HD neuropathy is characterized not only by an increased CSA but also by the pattern of asymmetry (ΔCSA>2.5 mm2 with an RR of 13) and focality

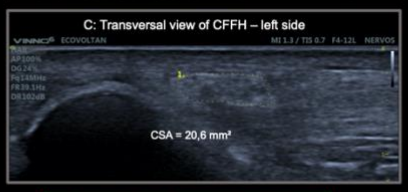
(ΔTPT>2.5 mm2 with an RR of 6.4) of this thickening, with high sensitivity and specificity for its early diagnosis. Peripheral nerve ultrasound based on the protocol for the assessment of leprosy neuropathy (Med CT, UT, UPT, CFFH, and T nerves) can be used as a point-of-care method for the early diagnosis of HD neuropathy.

Annex:





Primarily Neural with multiple hypertrophic mononeuropathy asymmetry and focality



ΔCSA CFFH (R: 28,78 mm² - L: 20,6 mm² = 8,29 mm²

ΔTpT CFFH R (28,78 mm²) – CFpFH R (14,54 mm²) = 14,54 mm²

ΔCSA CpFFH (R: 17,47 mm² - L: 14,54 mm² = 2,93 mm²

ΔTpT CFFH L (20,6 mm²) – CFpFH L (17,47 mm²) = 3,13 mm²