Background: The local anesthetic (LA) volume necessary for a successful nerve block has decreased with advancements in ultrasound (US) guided techniques. This has reduced the risk of systemic toxicity. However, lowering LA volume may reduce block duration, but the extent of this is unknown (1). The aim of this study was to determine the dose response relationship for LA volume and peripheral nerve block duration and nerve block duration variability. We hypothesized that increasing LA volume would prolong block duration, but there would be a ceiling effect. We also hypothesized that the variability of block duration would decrease with increasing LA volume.

Methods: After scientific ethical approval (file no. H-16000184) and registration at ClinicalTrials.gov (NCT02829697), we included sixty healthy volunteers for US guided, perineural injections of ropivacaine 0.2%. Volunteers were block-randomized to receive one of five different volumes: 2.5mL, 5mL, 10mL, 15mL or 20mL. We used a catheter-based technique to optimize blinding and to ensure a constant infusion rate of 10 mL/min delivered by an electronic infusion pump. As an experimental model, we used the common peroneal nerve. Volunteers and investigators were blinded to group assignments. Primary outcome: Duration of sensory block defined by insensitivity towards cold on the lateral part of the lower leg. Secondary outcome: Duration of motor block defined by paresis or paralysis of ankle dorsiflexion. We tested every hour from onset of nerve block to complete remission. We used ANOVA for analyzing the effect of LA volume on block duration. Intergroup differences were tested using the Mann-Whitney-U Test for Independent Samples.

Results: All included volunteers completed the study. Demographic data was similar among groups. ANOVA showed a significant effect of LA volume on both sensory and motor block duration (both P < 0.0001). Sensory and motor block durations were significantly longer using higher volumes than 2.5 mL. A ceiling effect for sensory block duration was apparent for volumes higher than 10 mL (Fig. 1). For motor block duration a ceiling effect was apparent for volumes higher than 15 mL (Fig. 2). The variability of both sensory and motor block duration was high and did not decrease with increasing LA volume.

Discussion: In this healthy volunteer, proof-of-concept study, we found a ceiling effect of LA volume and duration of common peroneal nerve block. However, in contrast to what we hypothesized, we found no difference in nerve block duration variability with increasing LA volume. Whether these findings are valid for other nerves and block types as well as in a clinical setting remain to be investigated.

Disclosures: None.