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INTRODUCTION AND RESEARCH GOAL

Spreading depolarization (SD) is a transient, intense cellular depolarization, that propagates slowly (2-6mm/min) across the cerebral grey matter. Typical electrophysiological features of SD are a large negative shift of the slow electrical or DC potential, and silencing of spontaneous cortical activity (spreading depression). The near complete depolarization of neural and glial cells consume energy, generating an increased metabolic need for ATP and glucose. SD-s are accompanied by typical cerebral blood flow (CBF) changes, which restore the normal metabolic state. The SD-related CBF response is composed of at least three distinct elements: a profound hyperemia is preceded by an early vasoconstriction, and followed by a long lasting oligemia. In cerebral ischemia, the SD-related CBF response becomes atypical, which may exacerbate the ischemic damage. Aging is the most important risk factor for the incidence of cerebral ischemic stroke; yet, it is not clear how age alters SD evolution.

MATERIALS AND METHODS

Animals: Male Sprague-Dawley or Wistar rats (2 months or 2 years old)

Anesthesia: halothane or isoflurane (1.5-2.2% in N₂O:O₂/2:1)

Transient global forebrain ischemia induction: bilateral occlusion of the common carotid arteries ("two-vessel occlusion", 2VO).

Experimental groups: Young SHAM, n=6; Old SHAM, n=6; Young 2VO, n=8; Old 2VO, n=6.

Surgical procedures: two small craniotomies (1.5 and 3 mm diameter) prepared on the right parietal bone.

SD elicitation: 1 or 3 M KCl through the caudal craniotomy

Acquired physiological variables: direct current (DC) potential, local field potential (LFP), laser Doppler flow (LDF) from the rostral craniotomy, mean arterial blood pressure from the femoral artery.

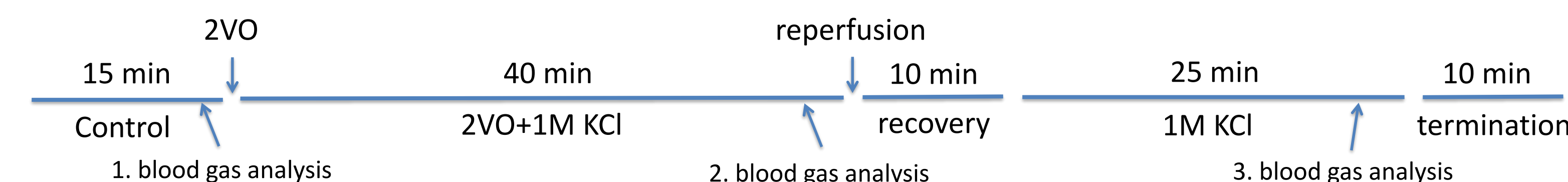


Figure 1. Experimental protocol.

RESULTS

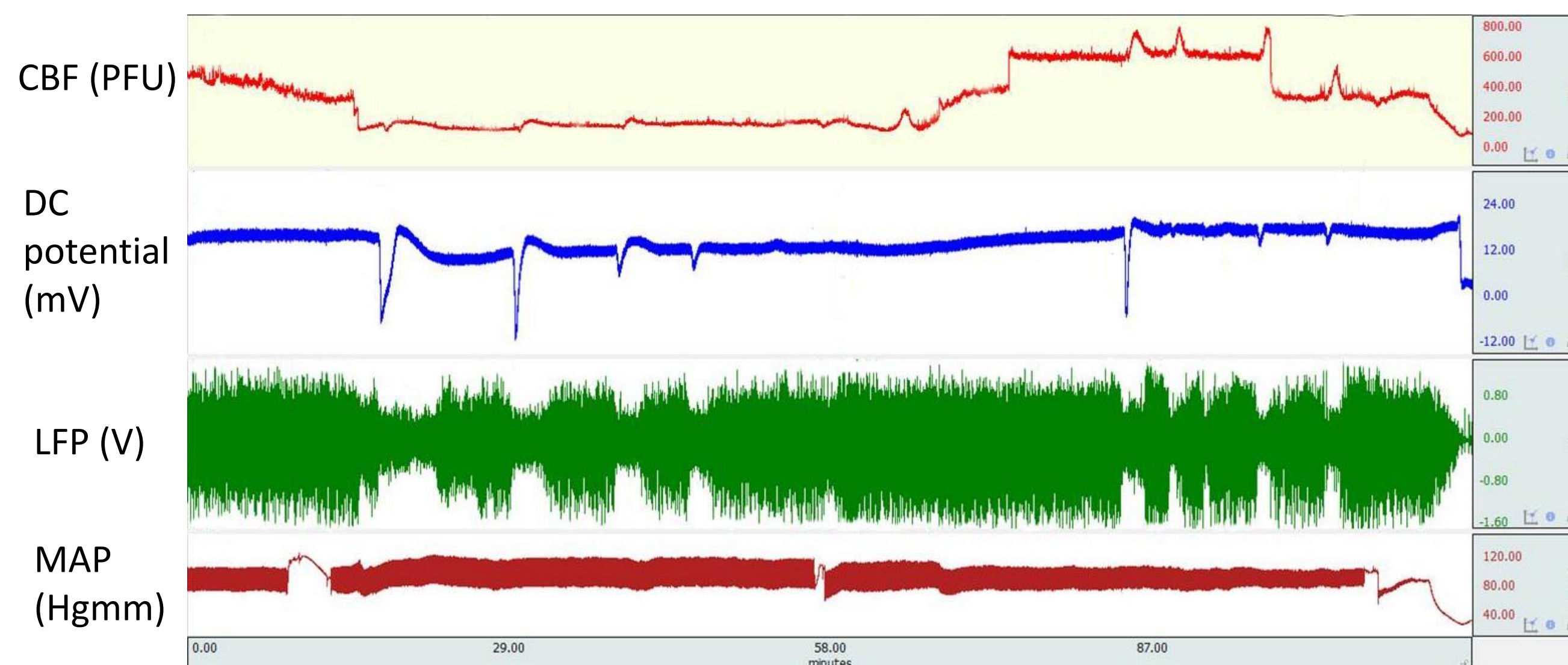
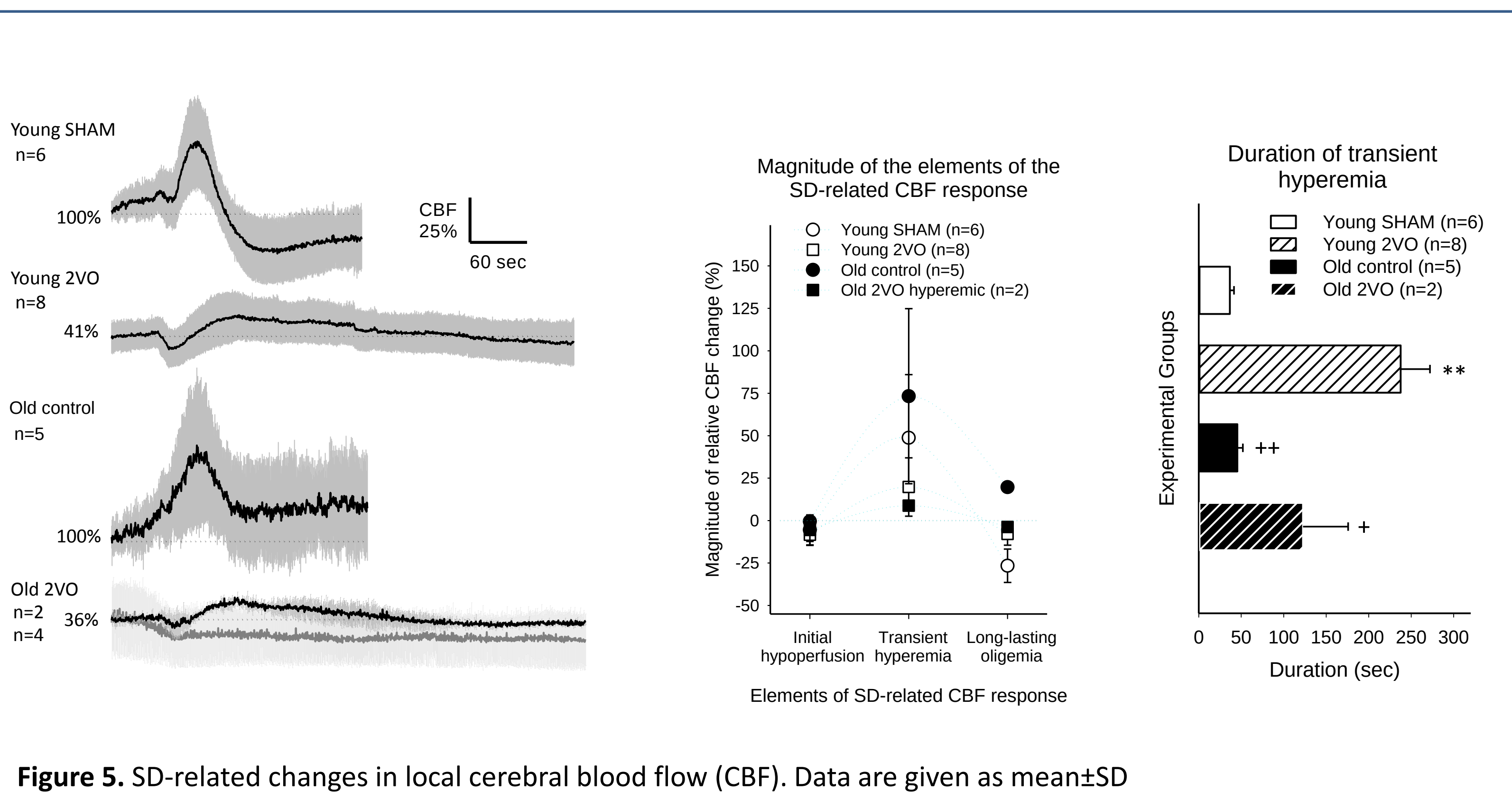
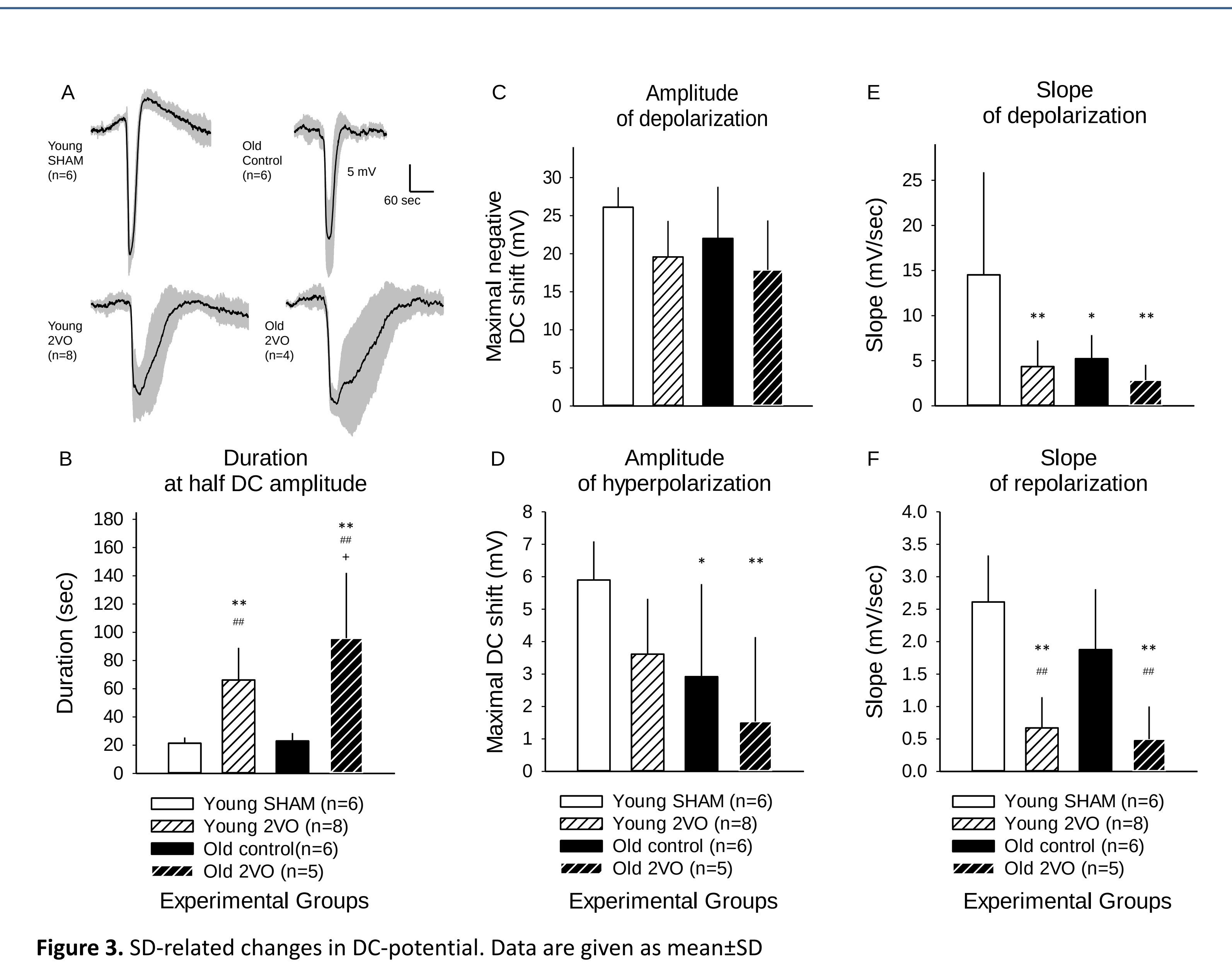
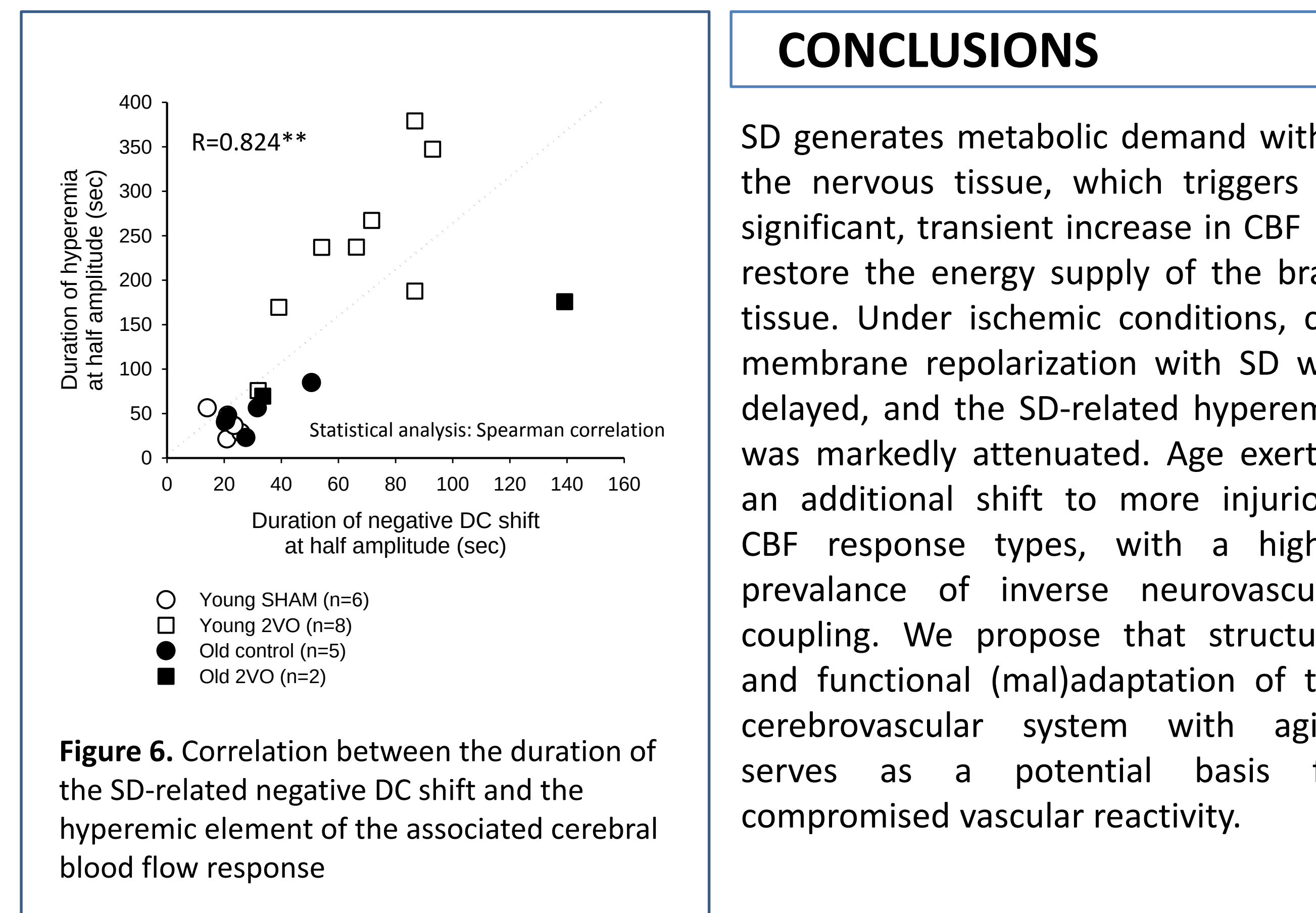
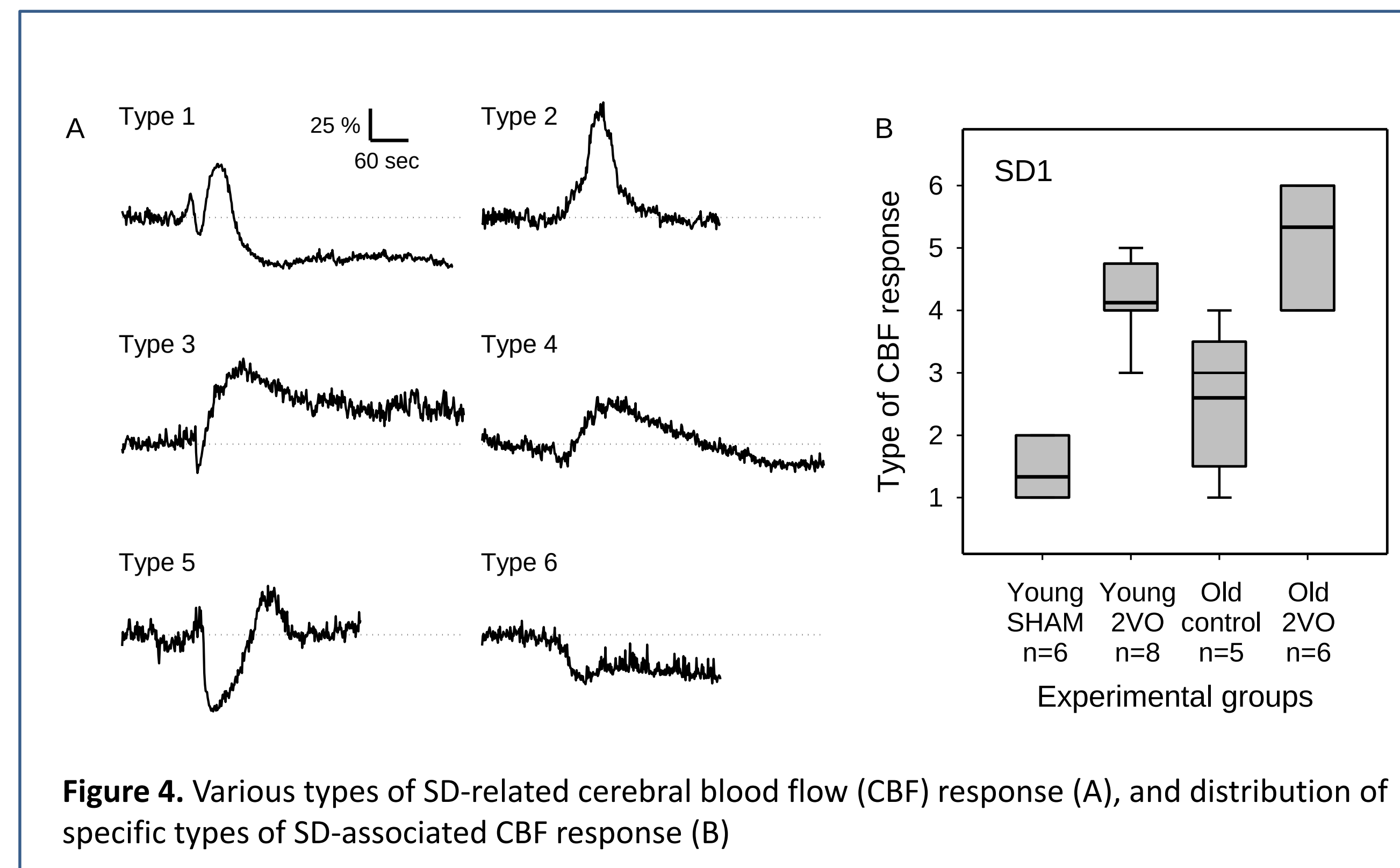


Figure 2. Representative recordings of the four variables under study. 1. Channel (top, red): Laser Doppler Flow (LDF) measured with a stainless steel doppler probe. 2. Channel (blue): DC-ECoG was measured via glass microcapillary with differential amplifier in DC-coupled mode. 3. Channel (green): EEG was measured via same glass capillary with differential amplifier in AC-coupled mode. 4. Channel (bottom, drone): MAP was measured via a left femoral arterial catheter.



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