Background:
Concussion is defined as a traumatic brain injury caused by biomechanical forces due to either a direct or indirect blow to the head, face, neck or body resulting in transient impairment of neurological function. The literature reports alterations in cerebral blood flow (CBF) as a result of head trauma, suggesting a potential prognostic indication for CBF as a biomarker of concussion.

Objective:
To explore differences in the 6 cervical arteries that contribute to CBF (Common Carotid Artery; CCA, Internal Carotid Artery; ICA and Vertebral Artery; VA) between athletes with history of concussion (Hx) and athletes without history of concussion (no Hx).

Methods:
82 asymptomatic university athletes were recruited during pre-season for baseline testing (42 females, 40 males); 36 athletes reported having Hx while 46 athletes had none. Doppler ultrasound (DU) (Logiq e Ultrasound System, GE Healthcare) was used to measure blood flow volume (BFV) in the CCA, ICA and VA, bilaterally.

Results:
An overall decrease in BFV was observed in all 6 vessels in athletes with Hx when compared to athletes without Hx. Females with no Hx had significantly lower BFV compared to males with no Hx in right CCA (β=-83.78; p=0.009); left CCA (β=-72.40; p=0.027); and right ICA (β=-74.84; p=0.010). Females with Hx had significantly lower BFV in right CCA (β=-140.79; p <0.001); left CCA (β=-126.895; p <0.001); and right ICA (β=-101.47; p=0.001). There were no significant differences between males and females, regardless of Hx in the VA bilaterally.

Discussion:
This preliminary data demonstrates sex-related differences, particularly in the anterior cervical vessels contributing to CBF in athletes with a history of concussion. This suggests soft tissue in the neck may be a mechanism influencing blood flow to the brain post-concussion injury. In addition, it supports the potential to use an already accessible tool for health care practitioners to help monitor concussion recovery.