The empirical evidence suggesting the feasibility of Virtual Reality (VR) and advanced imaging (fMRI, DTI, MRS & EEG) tools for an accurate assessment of functional/structural brain integrity in athletes suffering from concussions will be presented. The differential sensitivity of various brain imaging modalities as a function of time since injury will be discussed. Finally, the effect of single versus multiple concussions on brain metabolic integrity and associated cognitive and motor (predominantly balance) problems will be addressed. Indeed, long-lasting alteration of brain structure/functions may be detected in “asymptomatic” brain injured patients assessed by conventional clinical tools.