IDENTIFYING AND UNDERSTANDING CEREBRAL ANEURYSMS RISK FACTORS AND THEIR INTERACTIONS

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MINI-SYMPOSIUM PROPOSAL

Keywords: *keyword 1, keyword 2, keyword 3*

1 BACKGROUND

Balancing the risk of rupture of incidental cerebral aneurysms and the risks associated with their preventive interventions poses a critical dilemma for clinicians and patients when they have to decide whether to intervene or to conservatively follow a given aneurysm [1]. Many studies have identified several risk factors including patient and demographic characteristics, aneurysm anatomical and geometric characteristics, hemodynamic factors, and aneurysm wall properties [2]. However, the relative importance and interactions between these factors as well as the underlying mechanisms driving the progression of aneurysms towards rupture or stabilization remain poorly understood [3]. One important challenge in the study of aneurysm risk is the proper definition of end points for the analyses. Different studies have considered the aneurysm status at presentation (ruptured vs. unruptured), or stability of unruptured aneurysms (stable vs. growing), or risk predictors such as the PHASES score [4], etc. However, each of these approaches has its own selection bias, limitations, and difficulties associated to the data collection. The combination and cross-comparison of data from studies based on different end points to characterize aneurysm rupture risk holds the promise to identify common factors associated with different processes contributing to the destabilization and rupture of aneurysms and to provide a unifying view of the underlying mechanisms governing these processes.

2 PURPOSE

The purpose of this mini-symposium is to bring together cerebral aneurysm researchers with expertise in clinical management of aneurysms, neurosurgery, vascular biology, computational modeling, vascular imaging, and biomechanics, focusing on the interaction between the flow and biomechanical

environment of intracranial aneurysms and structural, mechanical and biological characteristics of aneurysm walls.

The goal is to provide a picture of the current knowledge in this field, describe current research efforts, and in particular discuss the role of different factors and processes in the progressive weakening or effective remodeling of the wall. Topics to be considered include: the role of hemodynamics, the role of biomechanics, effects of growth and remodeling, the role of inflammation, the role of lipid accumulation, the role of atherosclerotic changes of the wall, mechanical and structural characteristics of the aneurysm walls, histological and biological characteristics of the aneurysm walls, imaging the aneurysm wall, and statistical and machine learning approaches to aneurysm evaluation and rupture prediction. The mini-symposium will conclude with a dedicated slot for an open-forum discussion on the roadmap to achieve clinical impact.

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