Atrial fibrillation (AF) is associated with an increased risk of dementia and cognitive decline, independent of clinical strokes/TIAs. Aim of the present study was to study AF impact on the whole cerebral circulation through a computational hemodynamic analysis.

Two coupled lumped-parameter models (systemic and cerebrovascular circulations) were used to simulate sinus rhythm (SR) and AF. For each simulation, 5,000 cardiac cycles were analyzed, computing main statistics (mean and standard deviation) for different cerebral hemodynamic parameters.

During AF, the irregular heartbeat leads to transient periods of excessive capillary pressure or reduced arteriolar blood flow in the cerebral circulation. Therefore, AF per se candidates as a relevant mechanism into the genesis of AF-related cognitive impairment/dementia.