Since most ischemic strokes (~80%) occur in the territory of middle cerebral artery (MCA), many animal stroke models that have been developed have focused on this artery. The intraluminal monofilament model of middle cerebral artery occlusion (MCAO) involves the insertion of a surgical filament into the external carotid artery and threading it forward into the internal carotid artery (ICA) until the tip occludes the origin of the MCA, resulting in a cessation of blood flow and subsequent brain infarction in the MCA territory. The technique can be used to model permanent or transient occlusion. If the suture is removed after a certain interval (30 min, 1 h, or 2 h), reperfusion is achieved (transient MCAO); if the filament is left in place (24 h) the procedure is suitable as a model of permanent MCAO. This technique does not require craniectomy, a neurosurgical procedure to remove a portion of skull, which may affect intracranial pressure and temperature. It has become the most frequently used method to mimic permanent and transient focal cerebral ischemia in rats and mice. To evaluate the extent of cerebral infarction, we stain brain slices with 2,3,5-triphenyltetrazolium chloride (TTC) to identify ischemic brain tissue. In this video, we demonstrate the MCAO method and the determination of infarct size by TTC staining [1)].

1)

Chiang T, Messing RO, Chou WH. Mouse model of middle cerebral artery occlusion. J Vis Exp. 2011 Feb 13;(48):2761. doi: 10.3791/2761. PMID: 21372780; PMCID: PMC3197421.