



ARTICLE OF THE MONTH

Successful Serial Imaging of the Mouse Cerebral Arteries Using Conventional 3-T Magnetic Resonance Imaging

Makino H, Hokamura K, Natsume T, Kimura T, Kamio Y, Magata Y, Namba H, Katoh T, Sato S, Hashimoto T, Umemura K.
J Cereb Blood Flow Metab. 2015 Apr 29. doi: 10.1038/jcbfm.2015.78. [Epub ahead of print]
PMID: 25920958

In this issue of SNACC's Article of the Month, we explore a technical article in which 3-T MRI was useful in detecting induced cerebral aneurysms. This paper may be of use to translational investigators who deal with cerebral aneurysms in rodent models, both for its technical description of this type of imaging and because of the description of the creation of cerebral aneurysms. Aneurysms were induced using iatrogenic hypertension (achieved by nephrectomy, a high-salt diet, and DOCA) and a single injection of elastase into the CSF. This concoction was successful in inducing aneurysms in 6/10 animals, and SAH in 5/10 animals. To expound further on the subject, we enlisted the expertise of Dr. Ramachandran Ramani who is Associate Professor of Anesthesiology at Yale University and Director of the Neuroanesthesia Fellowship Program. His focus for this article is on the creation of aneurysms, and how this may be useful in future work in this regard. Please have a look at this Article of the Month, and let us know what you think by posting your thoughts on our [LinkedIn page](#).

-John F. Bebawy, MD

Commentary

Ramachandran Ramani MBBS, MD
*Associate Professor of Anesthesiology; Director, Neuro Fellowship
Yale School of Medicine*

In this article Makino et al have describe their experience of studying remodeling of mouse cerebral arteries in response to physiological and pathological stimuli, leading to intra cranial aneurysm and sub arachnoid hemorrhage. While many techniques have been described for remodeling of cerebral arteries the authors chose the technique of single dose elastase injection into the ventricles and systemic hypertension. To induce hypertension initially the mice were subjected to nephrectomy under general anesthesia and were fed a diet rich in salt. Deoxy cortisol acetate (DOCA) was also administered to induce hypertension. The chronology of events was as follows: first nephrectomy was done under general anesthesia and mice were fed a diet rich in salt and water. After seven days DOCA pellet was implanted and on the same day 35 units of elastase was injected into the basal cistern. The mice were followed up for two weeks with clinical examination and daily MRI in a 3 Tesla magnet.

Of the ten mice five developed subarachnoid hemorrhage within one week – when the mice were euthanized and brain was examined aneurysm with sub arachnid hemorrhage (SAH) was seen in the circle of Willis. A week later the other five surviving mice were euthanized and one of them had aneurysm but no subarachnoid bleeding. Out of the ten mice six developed intra cranial aneurysm and five of them had subarachnoid bleed within one week as a result of elastase injection and induced hypertension.

While most readers are aware that a combination of a weakness in the arterial vessel wall and systemic hypertension can induce aneurysm which could cause SAH from a aneurysm bleeding, in the present study Makito et al have demonstrated the development of intra cranial aneurysm and SAH and have imaged the remodeling of the intra cranial arteries induced by elastase and systemic hypertension. Authors also have described in detail the MR imaging technique with imaging parameters for identifying intra cranial aneurysm and SAH.

Significance: This model of intra cranial aneurysm could potentially be applied for bench research on influence of physiological / pathological factors which could cause rupture of an aneurysm leading to SAH. Studies on factors causing rupture of intra cranial aneurysm are significant because of the relatively high incidence of aneurysm (2-5%) and the low incidence of rupture of aneurysm. This model of remodeling of cerebral arteries could also function as a model for SAH and research on potential therapeutic efficacy of treatment of SAH.