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Rabbits are among the most widely used animals in experimental studies in basic and clinical medical sciences. MR images may also be coupled with the studies of rabbits and may provide important clues to the researchers.

Several coils and parameters may be implemented for experimental MR imaging of the rabbit brain, but because of the small size of this brain, the image quality may not be satisfactory. This letter briefly describes our efforts to improve the quality of MR images of the rabbit brain by using different coils and varying technical parameters.

We retrospectively evaluated the MR imaging of 87 male New Zealand white rabbits used in cranial experimental studies between 1994 and 2003 on a 1T system. Experiments had been conducted in conformity with the *Guide for the Care and Use of Laboratory Animals*[1] and were approved by the local ethics committee. A circularly polarized head coil, a quadrature extremity coil, or a 3-inch (7.62-cm) circular surface coil and fast spin-echo images were used. The images were reviewed by 2 experienced neuroradiologists and classified as not acceptable, poor, intermediate, and high quality with regard to the gray/white matter differentiation.

Among the 87 rabbits, 8 were in the group with the head coil; 56 in the group with the extremity coil; and 23 in the group with the 3-inch surface coil. The 3-inch surface coil was found to be superior to other coils because of its higher image quality, permitting a smaller field of view and a thinner section thickness–intersection gap in a shorter imaging time.

The use of high-powered MR imaging scanners and specifically designed surface coils for different body parts of the animals is preferred to obtain high image resolution and increased signal-to-noise ratio (SNR).[2-4] Despite their advantages, these devices are not widespread and in common use. Also, a radiofrequency coil fitted to the animal size is crucial because the SNR scales linearly with the filling factor of the coil.[5] The 3-inch surface coil was found to have the most suitable size for the rabbit brain in our study.

In summary, we recommend that in experimental MR imaging of the rabbit brain, a 3-inch surface coil may provide a more acceptable image quality than other coils in everyday practice.

References

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Packing Density in Coiling of Small Intracranial Aneurysms

The study from Goddard et al[1] in the September 2005 issue of *AJNR* entitled "Absent Relationship Between the Coil-Embolization Ratio in Small Aneurysms Treated with a Single Detachable Coil and Outcomes" is, in our opinion, an example of how poor methodology leads to a wrong conclusion.

The authors concluded that 25 small aneurysms (2–8 mm) achieved satisfactory stability despite having a low average packing attenuation of 8.2%. Their results contradict 2 larger previous studies conducted by us and comprising 145 and 144 aneurysms.[2,3] The volumes of aneurysms in our studies were either assessed by a custom-designed computer program that reconstructed 3D aneurysms from 2D angiographic images or from 3D rotational angiographic datasets; both methods were validated with phantoms. We found mean packing densities of 23% and 30% for all aneurysm sizes, much higher than the reported 8.2% by the authors. Moreover, a firm relationship between packing attenuation and aneurysm volume was found in both studies: Packing is inversely related to aneurysm volume, or in other words, in smaller aneurysms, higher packing densities are obtained than in larger aneurysms. As we review our data base of 445 small aneurysms of 2–8 mm and 176 larger aneurysms, we find a significantly higher packing in small aneurysms than in large aneurysms (24.6%, SD 8.0, range 5%–65% versus 21.9%, SD 5.8, range 8%–40%, *t* test, $P = .0001$).

The conclusion of Goddard et al[1] that "small aneurysms achieved satisfactory stability despite having a low average packing attenuation of 8.2%" is based on erroneous methodology of aneurysm-volume calculation, leading to structural overcalculation of aneurysm volumes and hence lower packing densities.

First of all, aneurysm size was assessed by comparing aneurysm diameter with the estimated size of internal controls such as the internal carotid artery or the basilar artery. This is an inadequate method because diameters of these arteries vary widely in individuals and estimation errors as small as 1 mm in a small aneurysm result in large volume errors. For example, a 3-mm spheric aneurysm has a volume of 14.1 mm^3, and a 4-mm aneurysm, 33.5 mm^3. Second, "largest" aneurysm dimension was used in the formula $V = 4/3\pi r^3$ to calculate aneurysm volume, which invariably results in overestimation of aneurysm volume because a sphere is the largest possible volume of a given diameter. For instance, the real volume of an aneurysm of $2 \times 2 \times 6$ mm is 12.6 mm^3, whereas their method calculated a volume of 113 mm^3. Therefore, the authors are euphemistic when they state, "This may have led to over calculation of the aneurysm volume and therefore lower packing." This point is illustrated in Table 1, in which aneurysm volumes are displayed for 382 aneurysms from our data base with estimated maximal diameters of 2–8 mm, assessed in the same way as described by Goddard et al.[1] Aneurysms of the same estimated maximal size vary 6–14 times in volumes.

Several data from the table in study of Goddard et al[1] are questionable and should have alerted the authors (and reviewers) to their erroneous methodology. For example, patient 4 has a 7-mm aneurysm (volume, 179.6 mm^3), and a 1.02-mm^3 coil is inserted (equal to the volume of a 2-cm GDC-10 Ultrasoft coil [Boston Scientific Corp, Natick, Mass]), resulting in a packing of 0.6%. This aneurysm did not show recurrence at a follow-up of 52 weeks. Imagine the angiographic picture of a 7-mm spheric aneurysm with a 2-cm coil in it. The aneurysm would not have been occluded at all, and "no aneurysm recurrence at 52 weeks" does not make any sense.

The reported low-mean packing of 8.2% in aneurysms of 2–8 mm by Goddard et al[1] in coiling is the result of structural overestimation of aneurysm volume. The statement that there is no relationship between packing and outcome in small aneurysms is simply not true and may even have serious consequences in daily practice. After reading