first clinical results with new devices. In addition, device manufacturers should assume their public responsibility instead of mainly striving for financial profit and high stock prices.

Only then can scientific and financial blunders like the Matrix coil be averted. For now, finally, we hang out the flag for the burial of the Matrix coil.

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EDITORIAL

Counterpoint—Response to "In Memoriam: The Matrix Coil"

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In this issue of the *American Journal of Neuroradiology* (*AJNR*), the Matrix and Platinum Science (MAPS) trial results are published.[1] The trial concluded that there was no superiority of the Matrix coil (Stryker, Kalamazoo, Michigan) over bare platinum coils. The MAPS investigators and sponsor should be congratulated on their willingness to test the efficacy of Matrix. The MAPS trial in no way negates the premise that the modification of coil surfaces or composition could potentially enhance coil performance and/or the long-term durability of coil embolization. To broadly extrapolate the MAPS results to all surface modified coils makes little sense.

While the approach taken by industry to promote the Matrix coil during the product launch certainly had serious flaws, this controversy should not cloud, or in any way diminish, the important clinical data provided by the MAPS study. With the benefit of hindsight, it appears that the coil vendor, as well as physician users, share responsibility for not demanding more robust data of improved efficacy over bare platinum coils before the routine use of Matrix in patients. Fortunately, our field continues to mature, and we have evolved past this to a large extent, as evidenced by the myriad industry-sponsored comparative coil trials that have been completed (Cerecyte trial, HydroCoil Endovascular Aneurysm Occlusion and Packing study) and those that are currently underway (Patients Prone to Recurrence After Endovascular Treatment, Hydrogel Endovascular Aneurysm Treatment trial, Framing Eighteen Coils in Cerebral Aneurysms trial).[1,2] These trials, like MAPS, represent real progress within our field and reflect recognition by physicians, as well as industry, that treatment decisions must be guided by reliable clinical trial data rather than marketing concepts that are based largely on preclinical studies.

Extensive preclinical studies were performed to better understand the results of coating bare platinum coils with a bioresorbable polymer. In retrospect, many of these studies were suboptimal in that they used an experimental aneurysm model that is now known to have low hemodynamic stresses and a high incidence of spontaneous thrombosis.[3]

The canine bifurcation model represents a better one for determining aneurysm coil performance, both angiographically and histologically.[4-9] In this model, the original version of Matrix was shown to undergo greater coil compaction and aneurysm neck recurrence compared with the conventional bare platinum Guglielmi detachable coil (GDC; Boston Scientific, Natick, Massachusetts), indicating that either the coil or the coating resulted in

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reduced performance.[10] However, the addition of complex 360° shapes improved the angiographic outcomes for both Matrix and GDC coils—making the 2 more comparable.

In a detailed analysis, the actual benefit of Matrix surface modification was in the histopathologic results, which showed that Matrix-treated aneurysms showed improved endothelization, manifest as an absence of endothelialized clefts at the aneurysm neck (which are prevalent in GDC-treated aneurysms).[10] Endothelialized clefts have been proposed as the etiology for late angiographic recurrences.[5] Late recurrences have been reported at 3 years in up to 15% of aneurysms that had been completely occluded acutely and in short-term follow-up.[11] While the MAPS trial showed that in the short term, Matrix was essentially equivalent to platinum coils, the real benefits of surface modification may be manifest in the results at late (3- and 5-year) follow-up.

Furthermore, in subgroup analysis, when aneurysms were adequately occluded (Raymond-Roy scale 1 or 2), Matrix had significantly better outcomes with only 2.7% requiring retreatment compared with 9.6% ($P = .01$) with platinum coils.[12] However, aneurysms with residual flow (Raymond-Roy scale 3) demonstrated poor outcomes in both arms—Matrix (24.2%) and platinum (16.1%) ($P = .17$). These observations coincide well with the known polyglycolic/polylactic acid (PGLA) characteristics, the polymer coating on Matrix coils. When exposed to high-flow states, PGLA experiences an acceleration of breakdown, nullifying any potential gain due to the bioactive component of the coil. These results suggest that the short-term issues with Matrix were more likely related to the adequacy of mechanical occlusion rather than the efficacy of the bioactive coating.

We believe that collaborative doctor/industry relationships are an important synergistic dynamic that is essential for continued technologic advancement in our specialty. It is critical that high standards be set for new technologies, particularly for those designed to treat diseases with well-established safe therapies. Regimented postmarket data collection and evaluation should occur with all new technologies, ensuring that marketing claims are not confused with scientific evidence.[13] However, to mix concerns with technology marketing or limitations in the implementation of a technology with a perception of failure of the fundamental scientific premise would be a mistake.

In our opinion, the concept of platinum coil surface modification to stabilize or increase the rate of thrombus organization is still valid and continues to have promise for enhancing long-term aneurysm occlusion stability. Time will tell whether this benefit will be reflected in the late-term MAPS data; the current data do not negate the fundamental concepts of bioactive coatings. As such, continued innovation toward the development of better delivery mechanisms or more durable bioactive responses is entirely reasonable.

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EDITORIAL

MR-Guided, Focused Ultrasound: Applications to Essential Tremor and Other Neurologic Conditions

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In this issue of the *American Journal of Neuroradiology,* a novel approach by means of MR-guided, focused sonography surgery (MRgFUS) is used to treat essential tremor.[1] The results indicate that clinical improvement is significantly related to total lesion size. No relationship was found between the imaging characteristics of the lesion and sonication number, power, or maximal temperature. Although the authors describe an important advance in the use of this procedure, the study also raises a number of questions regarding the broad application of this technique to various neurologic conditions.

The use of focused sonography to treat brain disorders has evolved over the past 70 years. In the 1950s, Francis and William Fry developed a system of converging sonography beams to pro-

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