Bottlenecks in Acute Stroke Care and Research
Solutions and Innovations

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We are pleased to introduce a new section in Stroke. As implied by the name, it is meant to be a forum for submissions dealing mainly with solutions for issues in stroke care and research that impact progress. Submissions may address the full range of problems arising in stroke research and care and should focus on the solutions that are proposed by the authors.

This section entails a departure from the traditional, hypothesis-driven, scientific communication. Why then might we need such a section? The traditional scientific article comprises a hypothesis, an experimental design to test the hypothesis, and results that comprise a clinical or laboratory data set. Analysis of the results then allows a discussion and conclusions to be made, thus leading to further hypotheses or changes to clinical practice that enable scientific progress. The resulting scientific article has a traditional format and undergoes a peer-review process to evaluate its scientific merit, importance, credibility, and the appropriateness of its conclusions.

However, progress has several components; an initial one is the innovation that leads to initial hypotheses or to changes in practice that must subsequently be tested. The Webster English Dictionary defines innovation as “the act or process of introducing new ideas, devices, or methods.” Clinicians and researchers do this all the time. Innovation takes place any time we try to improve on what we already do, frequently in response to a problem encountered in day-to-day work. As the definition suggests, innovation can happen at multiple levels. A team that comes up with an original training module for residents and fellows to enable them to allow fast, accurate interpretation of imaging in a time-sensitive situation is being innovative—not only through the contents of the module, but also through the idea that such a training module may enable more timely workflow in the first place. This new section in Stroke is about these initial ideas, especially when they provide a solution to a bottleneck that otherwise might slow down progress.

Who are the best innovators? In our view, they are the people who live in the trenches and face everyday problems. They are the clinicians who care for patients with stroke and the researchers who are faced with basic or translational challenges. These are the people who have the greatest incentives to devise solutions to impediments by introducing new ideas or methods. Everyday practitioners and academic researchers may be as or more qualified to solve a problem as are those whose full-time occupation is to conduct for-profit research and development. Not every innovation is patentable, and most do not entail new commercial products. Some may relate to improvements in workflow, an impediment when caring for a disease in which time is brain. Others may be ideas for improved communication that enables practitioners or researchers to share ideas more effectively. Some innovations may comprise new clinical trial designs, solutions to regulatory barriers, and ideas for breaking down barriers erected by conflicting commercial or academic interests. Many such innovations may be difficult to address in the traditional format of a hypothesis-driven paper.

A few illustrative examples are as follows: Recent studies of endovascular interventions for acute ischemic stroke such as Interventional Management of Stroke (IMS)–III have once again confirmed that time is brain and the need for speed. New endovascular devices now exist that enable practitioners to achieve high recanalization and relatively low complication rates. However, a major barrier in evaluating whether such technologies improve the clinical outcome of patients with acute stroke is the logistical complexity of achieving endovascular recanalization early enough in the stroke. Ultimately, we need to improve the workflow all the way from the time of stroke symptom onset to the time recanalization is achieved. A typical workflow involves multiple steps including dispatching an ambulance, reaching the correct hospital, registration, history taking, including current medications, blood work, imaging, and consent, organizing the interventional team, and finally implementing treatment. It is likely that there are significant variations between different centers in connection with how different aspects of this workflow chain are handled. If the goal is to achieve significant reductions in overall time to recanalization of blocked arteries, we need to learn from each other. One group may have optimized throughput in the emergency room, whereas the other group may have developed ways to reduce image acquisition and interpretation time to allow faster decision making. Ultimately, we need to be able to share this information.

Holdups to progress exist in all aspects of stroke care and research. Perhaps the most enduring problem has been the challenge of translating neuroprotectant drugs to human clinical utility. Are previous failures attributable to ineffective drugs? Misleading preclinical studies? Or poor trial design? Why has the time is brain concept been accepted in the design of trials of reperfusion therapies, whereas all previously completed...
neuroprotection trials enrolled patients in windows of ≥24 hours, when the test agents are least likely to be effective? Innovative approaches such as the implementation of prehospital therapy by the Field Administration of Stroke Therapy—Magnesium (FAST–MAG) trial paradigm may be needed to achieve enrollment in treatment windows in which brain salvage is still clinically beneficial. However, a major bottleneck with prehospital trials is patient selection: diagnostic inaccuracies outside of a hospital setting may lead to enrollment of a significant number of patients with a hemorrhagic stroke, or a stroke mimic, rather than an ischemic stroke. New ideas are needed to enhance the sensitivity and specificity of patient selection if neuroprotection is to be implemented in a prehospital setting. Moreover, because reperfusion is key, perhaps neither neuroprotection nor recanalization treatments can be maximally effective in isolation. A trial that incorporates both may have the best chance of success. Unfortunately, drug companies have little interest in devices, whereas device companies are generally disinterested in drugs—a major bottleneck in the implementation of hybrid trial designs incorporating both drugs and devices. Clearly, the field needs innovation at multiple levels.

Last, this new section in Stroke should not impede collaboration and the generation of intellectual property: The stated objective of most intellectual property law is to promote progress, a purpose that has been well understood and practiced for >2 centuries. By exchanging limited exclusive rights for disclosure of inventions and creative works, society and the patentee/copyright owner mutually benefit, and an incentive is created for inventors and authors to create and disclose their work. It allows for the collective to not only benefit from an individual’s innovations, but also to collaborate openly or build on each other’s work to further improve on the solution. It is expected that in the process of coming up with the kinds of solutions/innovations that we are soliciting, individuals or organizations will still be able to protect their intellectual property using traditional methods. The additional exposure and discourse that would be created by the publication of their idea may help the authors to form a company, create a marketable product, or develop industry collaborations. We see these as natural evolution of the process of problem solving. We therefore hope that this new section will provide a useful forum for presenting and sharing solutions and innovations.

We look forward to receiving, reviewing, and, hopefully, sharing your best ideas, solutions, and innovations with the rest of the stroke community to help move things forward.

**Disclosures**

None.

**Key Words:** stroke care ■ stroke delivery ■ stroke management
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