InterSECT

International Section for Early Career and Training

Building Cross-Disciplinary Research Collaborations

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As a broad and heterogeneous diagnosis, stroke stands at the intersection of many related specialties. Thus, stroke researchers have a unique opportunity to collaborate across a wide range of clinical and basic science disciplines. In addition to the more obvious collaboration opportunities (eg working with cardiologists on clinical trials with composite cardiovascular outcomes), stroke researchers may work in fields as diverse as primary care, oncology, obstetrics, cognitive neuroscience, physiology, biomedical engineering, environmental science, and health disparities.

Cross-disciplinary biomedical research synthesizes expertise from diverse contributing disciplines and develops new scientific approaches to address complex problems in health.[1] Cross-disciplinary approaches can be as simple as research collaborations involving several medical subspecialties. More complex endeavors, such as collaborations between clinical researchers and scientists from widely different disciplines (eg engineers or social scientists), may be termed transdisciplinary research; however, similar principles apply. For the purposes of this discussion, we refer to the entire spectrum of multidisciplinary collaborative research as cross-disciplinary research.

Collaborating with investigators outside your own field requires more than just adding a coauthor to a paper or proposal. True collaborations will not always be without conflict. Navigating the challenges of cross-disciplinary research successfully can lead to significant rewards in terms of job satisfaction and career development, and most importantly, to the advancement of scientific understanding.

Early career vascular neurologists interested in growing robust cross-disciplinary research collaborations might consider the following approaches.

Think Problem Based, Not Organ System Based

A good research question identifies a gap in knowledge about a specific problem, which, in turn, may require expertise from multiple scientific disciplines to answer. For example, a stroke neurologist investigating intracranial atherosclerosis might collaborate with a vascular surgeon studying peripheral vascular disease, a radiologist studying vessel wall imaging, or a biomedical engineer measuring arterial compliance. Alternatively, a stroke neurologist might be interested in rare causes of stroke affecting a particular population—for example, pregnant women or HIV patients. Such problems lend themselves to cross-disciplinary collaborations: the stroke neurologist provides the question of interest and the vascular neurology expertise, and the collaborating specialist provides a framework for understanding the context of the underlying systemic condition. In the case of transdisciplinary collaborations between investigators from widely divergent fields, a primary goal of the collaboration may not simply be to find answers but to develop entirely new approaches to questions. For example, a physicist helped develop new algorithms for interpreting complex data from intensive care monitoring systems, predicting outcomes in subarachnoid hemorrhage.[2] At another end of the spectrum, educators and artists have helped develop and implement a hip-hop-based curriculum to improve stroke awareness among children in high-risk communities.[3]

Seek Mentorship From a Senior Investigator in Another Subspecialty

Ask senior investigators in your own department if they have worked together on prior projects or served on committees together with researchers in other disciplines relevant your area of interest. Use NIH Reporter (https://projectreporter.nih.gov/reporter.cfm) to identify successful researchers who may be working on the problem you are interested in, or related problems. Do not be afraid to cold email and ask if they would be willing to meet with you. There may be opportunities to get involved in ongoing studies, perhaps adding a stroke-focused ancillary study—for example, collaborating with oncologists to measure stroke outcomes in a cohort of patients with breast cancer. A successful mentor in another specialty can introduce you to potential collaborators in his or her own field and potentially alternative funding opportunities. An advocate for your work outside of your department can also prove to be critically important in the hiring and promotion process.

Do Your Homework

Even early in your career as a clinical researcher, you are likely to be well acquainted with the stroke literature in your area of interest. However, other specialties may have extensive

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relevant literature with which you may be far less familiar. Ask your mentors or collaborators in the other specialty to direct you to important reviews or seminal papers. Consider inviting a potential collaborator to coauthor a review with you; although this can be a labor-intensive project, it can pay dividends by identifying your knowledge gaps and helping you become familiar with the preeminent investigators in the field. This strategy can be particularly useful for fellows who may not yet have well-developed research goals. Ask a senior investigator in the other specialty to recommend a fellow in their department to coauthor the review with you—this can be of great educational value to both junior researchers and may form a bridge to future collaboration.

Learn the Language—And Teach Yours

One of the most enjoyable aspects of collaborating with another discipline is the freedom to be a novice again. Nobody expects a stroke neurologist to be an expert in liver transplantation, so if you are working with a hepatologist on stroke outcomes after transplant, do not be afraid to ask basic questions. Similarly, your hepatologist colleague likely will not be familiar with the latest stroke guidelines. In fact, physicians in other specialties often know surprisingly little about stroke and are eager to learn from you. If there is interest in establishing a collaboration, put together a working group and have regular meetings, where early stage investigators can present preliminary results and get feedback in a multidisciplinary forum. You may quickly find yourself becoming the local stroke expert for another specialty and be invited to consult on their cases, present at their conferences, or coauthor papers or book chapters. Similarly, as you develop your newfound interest and expertise in transplant hepatology, you may find your neurologist colleagues referring liver patients to you. This can be an important way to build your niche both clinically and in research. Although transdisciplinary research presents particular challenges when investigators share little common vocabulary and knowledge base, the sometimes arduous process of learning to speak each other's language can itself lead to creative breakthroughs.[1]

Talk About Contribution and Authorship With Your Collaborators

Once you have established a collaborative relationship, it is important to clarify expectations from the outset. You do not want to be perceived as taking over another specialist's patients or projects. Conversely, junior investigators are vulnerable to having their ideas co-opted, especially by more senior colleagues. A good approach may be to offer your own services and expertise (such as proficiency in statistical software), in return for access to a needed resource (such as a data set to which you do not currently have access). However, be careful not to overcommit to large amounts of work without a clear expectation that you will maintain primary authorship. If the hypothesis being tested is yours, you should establish from the beginning that you will be first author on the paper and that your mentor or colleague from the other division will be a senior author. Either way, it should be clear to all participants what the roles and expectations are for each of the collaborators before work has begun on the project. As these discussions can be uncomfortable or even challenging, they are often led by a seasoned investigator in a mentorship role with experience in navigating the politics of funding and authorship. All collaborators should feel that their interests are well represented. If disputes arise that cannot be resolved within the group, then seek help per institutional or funding source protocols.

If you have grant support (or are applying), consider designating funding to support your collaborator's participation—for example, offer to cover part of a laboratory assistant or postdoctoral fellow's salary. For larger grants, add your collaborator as a coinvestigator and request salary support for him or her. Even if your grant is not funded, your recognition of your colleague's efforts on your project's behalf will be appreciated—and you may find the favor returned in your colleague's future grants.

Present Your Work to a New Audience

The decision of where to present your work, whether submitting an abstract to a conference, a manuscript to a journal, or a grant proposal to a foundation, is of critical importance. To build your reputation in stroke research, you want to present to your primary subspecialty colleagues. On the other hand, presenting and publishing outside your field raises your visibility and may lead to additional invitations to collaborate. Furthermore, breaking out of the silo can help you see your own work from another perspective, a process critical to scientific breakthroughs.[4] Ask yourself: What audience will find this work most interesting? Are you using innovative methods that could be applied broadly? Do your findings have implications for a particular population, such as neonates, or sickle cell patients? In such cases, you may find your work has as much clinical relevance to a pediatric or hematology audience as a stroke audience per se. However, it is also important to develop your scientific connections within your own field; wait to branch out to other specialties until you have established a track record of publication in your own discipline.

Good Projects Need Strong Leadership

Cross-disciplinary projects inherently are decentralized; however, someone must still guide the overall vision for the project. Although junior investigators may have less experience leading such an initiative, they can succeed with strong mentorship. Several researchers working together can form the basis for a core leadership team, with other members filling in needed expertise. Cross-disciplinary project leaders should identify clear research goals, set timelines (and stick to them), and ensure that multiple perspectives are being heard during meetings. Establishing a regular meeting schedule is critical to keeping a project on track, particularly when part-time researchers who may have demanding clinical schedules are involved.

Get Institutional Buy-In

Despite institutional trumpeting of cross-disciplinary initiatives and centers, academic medical centers often remain

locked into traditional structures and microspecialties, and participation in interdisciplinary collaborations has been undervalued compared with monodisciplinary research in academic promotion.[5] Speak with your mentors, division chiefs and chairs about the value of your work and the ways the department might benefit from your growing collaborations. Institutional support does not have to mean the creation of a multimillion-dollar center; it can be as simple as two divisions alternating hosting a monthly lunch conference. Frequent, informal meetings help to grow strong social networks outside the microinstitution of one particular academic division and reduce the organizational inertia, which can limit the vitality of an academic subspecialty.[6]

Conclusion

Engaging in cross-disciplinary research has been compared with learning a foreign language[1]: it requires reaching outside your own comfort zone. Despite the challenge, cross-disciplinary research collaborations have the potential to be exciting and fruitful for all parties involved. These relationships should be nurtured from an early stage. With care, they may develop into long-term partnerships, leading to creative breakthroughs and high-impact scientific discoveries.

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