

Hypothesis/Commentary

Reflections on Success in Multidisciplinary, Translational Science: Working Together to Answer the Right Questions

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Team science is becoming a norm in modern cancer research. The National Cancer Institute encourages multidisciplinary team science through Cancer Center Support Grants, SPORes, and other funding opportunities. As an epidemiologist who conducts team science, I am often asked what are the attributes of our multidisciplinary, translationally focused prostate cancer research team and what is it about our research environment that has led to our shared success. After being asked these questions so many times, I began to realize that not all team science proceeds as smoothly as ours. Thus, over the past several years, I have reflected on the explanations for our team's success.

In this editorial, I share the factors that contributed to our team science success, including attributes of the team members, incentives to be a team member, institutional factors that support team science, and institutional and national infrastructure for team science. I point to some of the complexities that our team has experienced while conducting multidisciplinary, translational research. I highlight the need for the team to focus on the most important questions together as not to lose focus and to have the greatest impact. Finally, I mention the need to expand included disciplines to continue to move team science forward to solve cancer problems.

Factors That Have Contributed to Our Team's Success

Attributes of team members

- *Shared interest*
We all care about the problem of prostate cancer and we have shared interest in solving this problem.
- *Complementary expertise*
We each bring different, but complementary expertise to the team. Because our expertise is complementary, we are not in completion with each other.

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- *Respect*
We have respect for each other and each other's disciplines. We actively foster in our trainees respect for and appreciation of the disciplines of our colleagues.
- *Generosity and trust*
We have a tradition of open exchange and helping and supporting each other. Our great and visionary leaders modeled this tradition.
- *Personalities*
Our personalities happen to mesh well, which leads to team cohesiveness.

Incentives to be a team member

- *Intellectual stimulation*
We find that learning about each other's disciplines, and how to jointly apply our methods to the same problem is intellectually stimulating.
- *Success begets success*
Mutual benefit from a shared endeavor is a powerful incentive to continue working together. Our team had immediate accomplishments, and continues to have success in identifying translational endpoints, publications, and grant funding to continue our work together.
- *Satisfaction in together training the next generation*
We formally and informally mentor each other's trainees, helping to energize and perpetuate our team and multidisciplinary approach. We are proud that together we have helped guide trainees who are going to be not just multidisciplinary, but intradisciplinary and transdisciplinary researchers.

Institutional factors supporting team science

- *Vision and strong leadership*
Historically and at present, our institution is known as a place to be for prostate cancer research.
- *Endorsement*
Our highly respected senior leaders endorsed team members and the multidisciplinary approach. They created opportunities for us to interact. But, we were not forced to work together; the team emerged organically.
- *Recognition of the scholarly efforts of investigators conducting multidisciplinary team science*
Our institution recognizes individual scholarly contributions of investigators who are together driving the work from their respective disciplines and investigators who make important scholarly contributions that change the approaches, directions, or the conclusions of the work conducted by

multidisciplinary teams. This recognition is necessary for promotion; team science could not thrive in the absence of this recognition.

Institutional and national infrastructure for team science

- *Venues for exchange*
Our local and national prostate cancer research leadership created, and continues to support, venues for exchange between disciplines.
- *Research prioritization*
Translational research is a major emphasis of the national cancer research agenda. Some funders require translational projects and cross-discipline collaboration.

Complexities of Multidisciplinary, Translational Team Science

- *Time and resources needed to build critical mass*
It takes time, energy, money, opportunities for unforced exchange of ideas, and demonstration of success and mutual benefit, among other factors to build an effective team.
- *Many cooks in the kitchen*
Despite being a team effort, one team member has to take responsibility to see a project through to its optimal endpoint. Otherwise, partially completed projects, even very important ones, languish.
- *So many great ideas generated, so little time to pursue them*
So many great ideas are generated when researchers from multiple disciplines work together, but there is not enough time to pursue them all. Prioritization of research ideas is absolutely necessary to continue to have success together.
- *Reviewers not yet prepared to review multi-, inter-, and transdisciplinary studies*
This is perhaps the biggest barrier at the moment. Until we train a sufficient cadre of full-fledged multi-, inter-, and transdisciplinary researchers, we need to recruit big thinkers as grant application and article reviewers.
- *Financial systems not yet prepared*
Working across disciplines usually involves multiple divisions of an institution each with its own culture of financial management and own financial software. This is not a huge barrier, but additional time must be allotted for budgeting and management.

Team Science Is a Powerful Approach, but the Team Still Needs to Focus on Addressing the Right—That Is, Important and Impactful—Research Questions Together

- *Obligation to address, together, questions that will generate knowledge that is actionable*

Again, when many investigators from many disciplines work together, so many ideas can emerge. Teams can become distracted. To avoid this pitfall, teams must focus on thinking big. Especially at this time of limited resources and funding, teams have the imperative to ask and prioritize research questions that aim to make a difference for populations at risk of cancer, newly diagnosed patients, and cancer survivors. Advances will result from the richness of the multidisciplinary perspectives of the team.

- *Still need to conduct etiologic cancer research, though*
Foundational research is still very necessary to move biomedical science. But, in conducting etiologic research, the team must avoid "me too science."

Moving Team Science Forward

- *Expand disciplines included in our multidisciplinary, translational research teams*
We need to learn how to collaborate with engineers and physical scientists to improve measurement, and information management and analysis. We also need to learn how to collaborate with interventionists to test the benefits of translational discoveries generated by team science, and then to implement and evaluate them. Learning how to collaborate will certainly involve learning each other's discipline's language and how to communicate ideas.

In summary, there is great value in working together across disciplines for individual researchers, for the team of researchers, for science, and importantly for populations and patients. Team science can be exciting to conduct because of the energy synergy. Team science has complexities, but these are not roadblocks to success.

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Disclaimer

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