

Developmental networks in translational science



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Mentorship has been positively associated with career development and research productivity, including scholarship and grant success,¹⁻⁴ whereas lack of mentorship in areas identified as “unmet needs” has been a significant barrier to career development and satisfaction.⁵ Although mentorship is universally highlighted as an important attribute for success, the evidence base for effective models of mentoring needs further strengthening. Newer approaches have emphasized the transition from the reliance on the dyadic (single mentor-mentee pair) and hierarchical (mentor is senior to mentee) model to a framework of developmental networks. Developmental networks, initially created and disseminated in the business world^{6,7} emphasized the importance of relationships with people who help get the work done, help advance one’s career, and provide personal support. Developmental networks may include traditional scholarly research mentors, advisors, peer mentors, e-mentors, colleagues, juniors, mentees, family, and friends who can provide access to knowledge, opportunities, and resources across institutions and cultures. Recently, Murphy and Kram⁸ have emphasized additional roles that can be filled by the “step-ahead” mentor, a colleague one level higher than mentee or a more experienced peer who has higher levels of skills or experience.

Is there a rationale for promoting the concept of developmental networks for investigators in transla-

tional research? Translational research as a continuum from basic science (T1) through clinical settings (T2), clinical practice (T3) to community and population applications (T4)⁹ transcends a single research area and approach and thereby requires new paradigms and mentoring models. Investigators need to understand how to translate basic laboratory science into application to humans including diagnosis, therapy, and prevention and diverse skills that may encompass first testing in humans and the translation of results from clinical studies into everyday clinical practice and health decisions.¹⁰ An important attribute that needs to be fostered is the bidirectional nature of translational research.^{9,11} One option is for translational researchers to seek out other translational researchers as mentors. However, this approach limits the trainee to the translational bridge of the mentors’ own research areas.

Another approach is for the trainee to create a network of mentors with different mentors being able to provide disparate but complementary research skill training or an even broader developmental network acknowledging the critical additional roles of sponsors,¹² “step-ahead mentors”⁸ (important in a new field), peers, students, friends and relatives. An approach that values networks allows trainees to cross disciplines of their own choosing and facilitates career development along a pathway independent of a single mentor. A recent study reporting the results of structured interviews of 100 former recipients of National Institutes of Health K (mentored training) awards emphasized the relevance of networks. Important themes that emerged included the numerous roles assigned to mentoring, the unlikelihood of finding a single mentor for all mentoring needs, the needs for mentoring changing over time, and the importance of mentoring networks.¹³ Thus, given the nature of translational research, we propose that the framework of developmental networks is particularly applicable to fostering the careers of investigators committed to discovery and innovation by bridging different research approaches.

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Table I. Steps to creating an effective mentoring network

Step	Description
Clarify your goals	Clarification of one's goals and assessment of strengths and weaknesses to achieve these goals. ¹⁸
Assess your situation	Assessment of one's context and environment for pursuing a translational research project. For example, if the goal is learning how to develop therapies targeted at cancer gene mutations, is there a researcher at one's institution who is an expert in genetic functional analyses and is there a researcher who is an expert in drug development? If not, can faculty at your institution connect you with experts outside your institution?
Build your network	Building of a developmental network through shared interests and collaborations to help achieve goals.
Repeat	Regular reassessment of one's goals and developmental network to make sure that the composition and size of the network aligns with changing goals.

Table II. Instructions for developmental networks pre-exercise: roles of network members

Instructions for Part I: We ask you to critically examine your network so that you can reflect on your own support system considering the questions: "What are my goals in translational research?", "What skills do I have for reaching those goals?" and "What skills do I need?" For this exercise, we define your network as the set of relationships that help you to get your job done, advance your career, and provide both personal and professional support. As you think back over the past 1–2 years, consider the following 3 types of relationships.

Relationship	Role	Symbol
<i>People who help you get the job done</i>	Helpful and useful in doing your work, may work directly with you, or have provided leads to others who helped you with important information, scientific or technical advice, professional expertise, or other resources to do your work	
<i>People who help you advance your career</i>	Contribute to your professional development or career advancement; give you career guidance or direction, arrange exposure to critical people, provide political advice, serve as "sponsors" ¹⁸ to help you get important opportunities or assignments (such as appointments on hospital or national Committees, journal editorships, or grant panels), advise you on promotion, provide advice on funding opportunities, and/or advocate for you	
<i>People who provide personal support for you</i>	People you go to for your emotional well-being and psychosocial support; ones with whom you share experiences (positive and negative, consult about decisions or concerns that are important to you, vent or commiserate with, debrief critical experiences with); and people with whom you can be yourself	

Instructions for Part II: Once you have critically examined your network according to these relationships, you should complete [Table III](#) as follows: people with whom you have more than one kind of relationship should be listed more than once (ie, one person could be in 2 or 3 categories). In addition to considering people who perform these functions in your network, we also want you to place them in the column that best describes the type of relationship you have with them. Close relationships are ones where there is a high degree of trust, liking, and mutual commitment. Distant relationships are ones where you do not know the person very well. Moderate relationships are in the middle, neither very close nor distant.

In [Table III](#), indicate by a star (★) those people whom you see as very well connected in your department or hospital or professional circle, including someone who "sponsors" you. That person might be an actual leader or just somebody who seems to know many other influential people. Write "mentor" or "mentee" inside the shape (square, triangle, or circle) of anyone you consider in that role.

Building on the concept of developmental networks in business, we adapted an assessment tool developed for managers and business students¹⁴ for the world of academic medicine and created a program, which we have used for trainees and faculty in departmental and medical school leadership programs as well as national audiences of postdoctoral trainees and junior faculty.

The aim of these programs is to increase knowledge about the value of developmental networks and introduce learners to the application of developmental networks for their career trajectory.¹⁵ We propose that this exercise may be especially useful to assist in the career development of translational researchers. This approach to developmental network building was

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