The number of family physicians involved in clinical research at academic medical centers is decreasing due to a shrinking pool of research resources and increasing clinical demands. Indeed, reduced clinical incomes and fragmented research infrastructures have become major barriers for academic family physicians seeking to participate in research. However, while budgets for biomedical research are tight and may remain so for several years, funding for translational research appears to be growing. Translational research, broadly defined here and discussed in more detail later, is taking the findings from bench research and clinical trials and studying the safety, efficacy, feasibility, and acceptability of implementing those findings in community-based clinical practice. Family physicians are a natural fit for such clinical translational research. To maintain the vibrancy of family medicine research, there is a need for family physicians to become translational scientists involved in and seeking funding for translational research. The number of family physicians involved in clinical research at academic medical centers is decreasing due to a shrinking pool of research resources and increasing clinical demands. Indeed, reduced clinical incomes and fragmented research infrastructures have become major barriers for academic family physicians seeking to participate in research. However, while budgets for biomedical research are tight and may remain so for several years, funding for translational research appears to be growing. Translational research, broadly defined here and discussed in more detail later, is taking the findings from bench research and clinical trials and studying the safety, efficacy, feasibility, and acceptability of implementing those findings in community-based clinical practice. Family physicians are a natural fit for such clinical translational research. To maintain the vibrancy of family medicine research, there is a need for family physicians to become translational scientists involved in and seeking funding for translational research.

From the Department of Family and Community Medicine (Dr Khanna), Department of Epidemiology and Preventive Medicine (Dr Roghmann), and Department of Medicine (Dr Tacket), University of Maryland; and Center for Policy, Planning, and Evaluation, District of Columbia Department of Health (Dr Nesbitt).
Trials. These investigators generate and test hypotheses that lead to new diagnostic and therapeutic interventions applicable to human health. T2 is the application and dissemination (i.e., translation) of T1 discoveries into community practice and health policy by clinicians, community-based groups, and policy makers. It is in T2 research that family medicine should be involved.

Translation of research into the community (T2) requires several key items. One is a fundamental and basic trust of the community in the clinician scientist, based on a record of providing excellent health care and engaging the community in the dissemination of new discoveries, community education, and outreach. To develop that trust, it is essential for clinician scientists to ensure a two-way communication channel by offering educational programs in community-based participatory research (CBPR) directed not only to university investigators but also to members of the community. This type of research often takes place in the practice-based research networks linked to family medicine residency programs around the country. Such research is based on key principles of CBPR, namely (1) community engagement, (2) community outreach, (3) community education, and (4) community participation in research objectives and planning. The goals of CBPR are to increase the relevance of research to communities while maintaining standards of scientific rigor, promoting community capacity building, and application of the results to improve health.

Other key items for T2 research include focusing on the principles of health communication, cultural competence, health literacy, elimination of health disparities, and ethical principles essential to community engagement. Ultimately, integrated T2 translational research and delivery of new technologies to the community need to include research, practice, and policy in a single efficient platform (Figure 1).

The Roadmap

Recently, the opportunities for family physicians to become in-

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**Figure 1**

**Translation of Clinical Research Into Practice**

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T1: Translational Research, Type 1, T2: Translational Research, Type 2
E: Evaluation, Generate New Hypotheses
volved in research have increased through efforts of the NIH roadmap. The roadmap attempts to develop new paradigms for interaction within the research community and to specifically include clinicians who are translational scientists. Mechanisms to implement this change are the Clinical Translational Science Awards (CTSA) initiative from the National Center for Research Resources, the Multidisciplinary Research Career Development Program (designed for research career development of junior faculty and postdoctoral fellows across disciplines), and the National Clinical Research Associates program (NCRAs).

NCRAs will be recruited from among community and academic clinicians to form a cadre of practitioners who will receive training in the responsible conduct of research and participate in the organized National Clinical Research Associates (NCTR) Network. NCRAs will form the link between NIH discoveries and clinicians in the community who can execute clinical studies in a community-based, rather than academic, setting (ie, T2 translational research). These programs provide a path for clinician scientists, including family physicians, to participate in translational research.

Enhancing the role of the clinician scientist in the clinical research workforce (Table 1) can have multiple benefits to both T1 and T2 researchers. A two-way process will link promising findings for advanced phases of clinical research to the community and provide important information about the safety, efficacy, acceptance, and implementation of new drugs and diagnostics in the community.

### The Role of Family Medicine

While the practice of family medicine is undergoing a shift to outpatient, community-oriented care, residency training has remained firmly based in the inpatient, acute care academic setting. A new model for family medicine residency, such as that developed at Duke University, focuses on the outpatient and community setting, chronic disease prevention and management, team building, and leadership training. This clinical paradigm could limit family medicine to outpatient, non-research settings, but it also could be expanded to include training in the responsible conduct of clinical research and produce a new generation of clinician scientists who operate in the community. Training of family medicine clinician scientists can provide an attractive path for recruitment of medical students who are attracted to both clinical research and community-based practice.

Family physicians are the primary and sometimes only point of contact in the health system for many patients, some of whom would benefit from participation in clinical trials or other forms of clinical research. Family physicians are also well placed to participate in outreach activities in racially and ethnically diverse communities that have traditionally been reluctant to participate in clinical research. This perspective is a key opportunity for specifically addressing T2 research aimed at eliminating health disparities by building on community engagement and personal empowerment, or self-efficacy, to encourage public trust in innovative research. Translational research of the future must consider disparities in the incidence and outcomes of disease and in the responses to new therapeutic interventions among all groups, including the underserved.

### Table 1

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<tr>
<th>National Institutes for Health Initiatives</th>
<th>Reengineering the Clinical Research Enterprise</th>
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<td>• Training mechanisms for junior clinical faculty</td>
<td>• Clinical infrastructure development targeting community-based and academic clinicians</td>
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<tr>
<td>• Multidisciplinary Clinical Research Career development programs</td>
<td>• Clinical Translational Science Awards</td>
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<td>• Traditional K23 clinical program</td>
<td>• National Clinical Research Associates</td>
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<td>• National Electronic Clinical Trials and Research Network (NECTAR)</td>
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the last year of training. Another mechanism for training is one-on-one mentoring of residents with an academic or community-based investigator.

The extension of the family medicine residency program to include an additional training year for clinical investigation has also been proposed and is being explored.23 This extra year of training would follow completion of residency training and ideally be combined with formal credit courses leading to an advanced degree or certificate in clinical or translational research.2 Such T2 research training is amenable to a variety of implementation formats, including an additional year of residency, a fellowship, or junior faculty training. The core curriculum could include topics of general interest such as bio-statistics, bioethics, study design, federal regulatory guidelines in research with human subjects, scientific writing, and team leadership.15,18 Further research training after residency as fellows or junior faculty in formal programs such as NIH-supported Career Development (eg, the Multi-Disciplinary Clinical Research Career Development K12 Program) or a master’s degree in clinical research would be highly desirable for those pursuing research-intensive careers.

Conclusions

Biomedical research is incomplete without the translation of new findings into the community. Education programs in family medicine are well positioned to nurture a cadre of clinician scientists to spearhead the T2 research translation. It is critical that family medicine identify its role within this newly developing translational science paradigm, develop educational pathways to train family physicians in T2 research, and nurture a new generation of family physician scientists.

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