Chapter 1

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The ultimate goal of biomedical research is a healthier population. The road to this end result, though, is made up of a great many intermediate goals: for example, improved understanding of basic biological processes; identification of the nature and causes of specific diseases and disabilities; development of ways to identify, prevent, diagnose, or treat diseases; exchange of relevant information; and delivery of services.

One important characteristic that most of the intermediate goals and objectives have in common is their dependence on science and technology. The Office of Technology Assessment (OTA) defines technology as the practical application of organized knowledge. Medical technology is defined as including drugs, devices, and medical and surgical procedures, and the systems in which such technologies are delivered *(85).* For example, prevention of disease is both a technology in itself and also depends on effective technologies (such as vaccination or public education) for its attainment. Thus, one of the principal outcomes of health-related research is the development and subsequent use of medical technologies.

The process through which technologies are brought to existence and employed in everyday medical practice is not a simple one. It involves, as will be covered later, a series of overlapping and often cyclical stages. For purposes of analysis, OTA divides the process into research and development (R&D), evaluation, diffusion, and use (delivery, financing, etc.).

Technology transfer is often thought of as involving primarily the diffusion stage—the spread of a new technology into common use. However, the success and appropriateness of any technology's transfer or diffusion is heavily dependent on all the stages that precede use. Thus, technology truansfer-related *activities* are viewed in this report as involving R&D, evaluation, dissemination of pertinent information, and technology transfer (or diffusion) itself.

The timely and appropriate transfer of technologies from a research setting into medical practice has important implications for the quality of health care, access to care, and the cost of care. For this reason, the transfer of biomedical knowledge into technologies, the assessment of the resulting technologies, and their spread into health care settings continue to be areas of congressional concern.

The National Institutes of Health (NIH) is the primary institution in the United States for the first two of the above processes (the development and the assessment of technologies) and one of the key actors in the third. Because NIH plays such a large and critical role in the substance and the quality of technology transfer, it exerts a powerful influence on the priority given to technology transfer by other groups, on the state of the art of assuring effective transfer, and on the generation and flow of information about technologies, especially their benefits, risks, costs, and readiness for widespread use.

The House Committee on Energy and Commerce requested that OTA examine the role of NIH in assessing and transferring medical technology. This technical memorandum, Technology *Transfer at the National Institutes of Health,* presents the results of that examination.

It was prepared during February and March of 1982. As with all OTA technical memoranda, it contains no policy options for congressional consideration. In response to the committee's primary concerns, it covers NIH in regard to its R&D activities as they relate to the development of medical technologies, its demonstration and control programs and other activities related to transfer of technologies, its efforts to disseminate information on medical technology, and the extent and form of its assessment activities. It draws heavily on earlier OTA *studies,* especially *Assessing tile Efficacy and Safety of Medical Technologies (85), The Implications of Cost-Effectiveness Analysis of Medical Technology (89), Development of Medical Technology* Assessment: *Opportunities* for *Assessment* (88), *Strategies for Medical Technology Assessment (92),* and *Technologies for Determining Cancer Risks* From the *Environment (86).*

ORGANIZATION OF THE REPORT

Chapters 2 through 5 cover NIH in general. Chapter 2 discusses biomedical R&D, providing background information on the process of biomedical science and its relation to technology development and transfer, on the Nation's and NIH's investment in biomedical research, and on the organization of NIH.

The third chapter presents a description of the process of technology transfer. It is designed to provide a context for the later examinations of current technology transfer activities at NIH. Chapter 4 highlights the role of evaluation of medical technologies as part of the R&D and transfer processes.

Chapter 5 presents and examines the current technology transfer activities engaged in or supported by NIH.

Because of their size, importance, and levels of relevant activities, the National Cancer Institute (NCI) and the National Heart, Lung, and Blood Institute (NHLBI) have been highlighted. A major share of attention has been devoted to NCI because of continuing congressional concern over the conflicting pressures on NCI related to transfer and assessment of technologies for preventing, diagnosing, and treating cancers. Chapter 6, therefore, is on NCI. NHLBI has been focused on because it is probably the single most active institute in technology transfer. It has devoted considerable thought and funds to such activities. Thus, chapter 7 covers NHLBI and its transfer and assessment activities.

Chapter 8 presents the findings and conclusions of the study.

Appendix A is a glossary of acronyms. The second appendix contains background material on NIH's process of awarding grants and contracts, including a discussion of peer review. Appendix C is on NHLBI clinical trials.