Mr. Chairman and Members of the Subcommittee:

My testimony this morning is based on 40 years of personal experiences in research on infectious diseases, including a 30 years' war on poliomyelitis, as well as on many years of service on various committees involved in granting federal funds for medical research.

Fully recognizing the importance of assuring that the laboriously acquired existing knowledge not remain on library shelves to be admired like great works of art in museums but be expeditiously put to work for human welfare, I nevertheless wish to limit my present testimony to the problems involved in the acquisition of the new knowledge that is needed for the elimination or alleviation of human disease and for the improvement of human health.
Let me first of all agree with the many people who testified before you on the importance of the individual scientist's search for knowledge for its own sake as the very foundation of scientific endeavor that must continue to be supported and expanded if science is to provide the means for the solution of the many problems of importance to human welfare. Unlike many other types of scientific research, medical research is by its very nature oriented toward specific goals directly related to human health. As I see it, the real issue in medical research is concerned not so much with a proper balance between so-called basic research, designed chiefly to provide understanding of life processes, and so-called applied or mission-oriented research designed to achieve a well-defined objective like the prevention, alleviation or cure of a disease, because to achieve the latter you must also invariably also engage in the former - as it is with a proper definition of important specific targets that call for and are ready for a concentrated, well-planned and coordinated research effort. As more and more people are entering the field of medical research and more and more money becomes available for it there is unfortunately an increasing proportion of persons who choose to work on little problems that they can handle by themselves or in collaboration with small groups of junior investigators. The important issue, it seems to me is whether enough is being done to develop acceptable mechanisms for coordinated and cooperative research - regardless of whether it be for achieving the initial basic understanding or the ultimate control of a disease - to attack those larger and more
complex problems whose solution can be markedly retarded if the necessary
work is left to the chance interests and uncoordinated efforts of the individual
scientists. My own conclusion is that much more needs to be done than is
now being done, and in the remainder of my testimony I should like to examine
the question of whose responsibility it is to plan for a more concentrated
attack on the more complex disease problems, and to consider new mechanisms
for planning, for establishing priorities for funding - because money for
research must be budgeted as it is for everything else - and for implementing
the decisions that are reached. The decisions that I have in mind would have
to be made by the most competent scientists who will have to do the work,
by the administrators in conjunction with their advisory councils who will
have to establish priorities on the basis of relative importance and need,
and by the Congress representing the public from whom the money will have
to come for translating reasonable plans into working projects.

In answer to the first question posed by your committee I would,
therefore, say that there is a need for additional attention by federal agencies
in the field of biomedical development, particularly for establishing suitable
procedures for planning and implementing the type of collaborative research
that I have just mentioned. Various professional societies, including the
Division of Medical Sciences of the National Research Council, as well as
federal agencies such as the National Institute of Health and the Armed
Forces Epidemiological Board, often arrange symposia or special study
groups to emphasize or identify research needs relating to certain diseases or health problems and these are useful in calling attention of the scientific community to important fields of research that are either neglected or receiving insufficient attention. With relatively few exceptions, however, the implementation of these needs is left to chance - the chance that individual scientists will develop an interest and come up with suitable programs. I believe that certain federal agencies, particularly the National Institutes of Health, through the intramural programs of their disease-oriented institutes and their function as transmission belts of public funds for the support of extramural research, have both special opportunities and special responsibilities for assuming the leadership for both the planning and the implementation of the type of research on the complex problems that are not now receiving sufficient or adequate attention from the efforts of individual scientists.

In reply to the second and third questions posed by your committee I must say that in my judgment existing procedures for the establishment of long-range plans and priorities and for their implementation are not commensurate with the needs. Lest I be misunderstood I want to say to begin with that the National Institutes of Health of the United States, justifiably envied throughout the world, constitute one of the finest national resources of this country. The methods used in the past, under the extraordinarily able leadership of the present director, Dr. James A. Shannon, have
contributed to the most extraordinary growth in medical research capability in this country. The procedures used in the past for evaluating the research activities of individual investigators through the agency of expert study sections is still the best that has been devised. There is, however, one legal provision, which, in my judgment, has not only outlived its usefulness but is actually hampering the fulfillment of the missions for which the institutes were established. I have reference here to the legal requirement that the National Advisory Councils must approve applications for research grants, already carefully evaluated by the specialized study sections, before payment can be made. The National Advisory Councils lack the competence of the study sections and the extraordinarily large number of applications in recent years makes it virtually impossible to look at more than a few applications, and with only rare exceptions the recommendations of the study sections are confirmed. Yet most of the time at the three annual meetings of the National Advisory Councils, preceded by many hours of home work, is usually taken up with a consideration of individual applications to the exclusion of more important functions of advising on the optimum utilization of funds by assigning priorities to the different spheres of activity falling within the mission of the institute, or in the evaluation of the overall planning of the activities of the institute. I frankly do not regard my own present service on the Advisory Council of the National Institute for Allergy and Infectious Diseases as fulfilling any useful function, I would strongly recommend that the present Act be
amended to remove the requirement of approval of individual research grants by the National Advisory Councils. I would hope that this would free these councils for another type of activity in which their judgment can be used in evaluating plans for collaborative research and in assigning priorities to the various projects that are proposed.

In his testimony before your committee on March 1, Dr. Shannon also expressed the opinion that the activities of the Institute Councils in reviewing individual grant applications for so-called program relevance are now less feasible as well as less meaningful, and stated that "it has been possible to shift the emphasis of Council activity to the broad consideration of program planning and evaluation." As far as the Council on which I am serving is concerned this still remains a desirable achievement for the future. Dr. Shannon also stressed that "the planning process must be centered in the fulltime activity of the staff of an Institute" but "given this, there then emerges a special role for the Council and for special disease- and problem-oriented committees." He stated that such special planning committees, "with membership drawn from outstanding experts in relevant areas" are now in the process of "being set up throughout NIH programs", and that "each Institute may have as many of these committees as are needed to cover its major disease or disciplinary concerns." He further stated that "committee responsibility for its assigned area includes examining and reporting on 'the state of the art', and identifying gaps in present support
as well as areas warranting increased program attention."

Although a few such activities have been in existence for a number of years in several institutes, e.g. the chemotherapy and leukemia contract programs of the National Cancer Institute and the Collaborative Contract Program for development of certain vaccines and for studies on the immunology of organ transplantation of the National Institute of Allergy and Infectious Diseases, the establishment of "disease or specific problem-oriented committees" at the National Institutes of Health is still largely a matter for future accomplishment. Moreover, if the main function of such committees will be only to identify gaps in present activities, as indicated by Dr. Shannon, without some new plans for implementing their recommendations and for establishing priorities for carrying through their recommendations I fear that very little progress will be made. Existing contract programs, under control of full-time Institute staffs and not subject to evaluation by the Institute Advisory Councils, have come under considerable criticism for the type of research programs they have contracted, for the frequent poor caliber of contractors, for insufficient participation of the working scientists in developing cooperative research plans and for being only another form of especially costly, individual project type research without the usual evaluation of study sections and without the necessary ingredients of a coordinated plan of attack.

I would like to concur in the desirability of establishing as soon as possible as many of these "disease or specific problem-oriented committees"
as each Institute may require to cover the various fields within its mission, and also to suggest some specific procedures for the operation of these committees and what should be done with their recommendations to permit optimum implementation and the greatest benefit for the solution of important problems. Briefly my proposals are as follows:

1. Each Institute director, aided by his full-time staff, and with the advice of the chairmen of the Institute study sections and of the Advisory Councils for the intramural and extramural programs, shall draw up a list of important disease problems for evaluation of current activities, not only within the framework of the intramural and extramural programs of the Institute but in the country and world at large, and for a decision whether or not programs could be accelerated by a cooperative and coordinated effort in the light of available technology.

2. The ad hoc committees charged with an evaluation of a specific problem shall be made up predominantly of people currently working in the field and with only an occasional "elder statesman" with past experience in the field.

3. If the decision of the committee is that in the present "state of the art" very little if anything could be gained from a collaborative, coordinated program its immediate assignment would be finished, until such time as new developments may justify its reactivation.
If, however, the committee decides that there are important gaps in our knowledge which could be filled optimally by a coordinated, cooperative effort, it should then be charged with drawing up the research plan and provide an estimate of manpower needs and cost. If money were no object, the committee could then be charged to proceed with implementation of its program by recruitment of participating investigators, etc. - but as we know only too well money is not now available for everything that reasonable people believe should be done for the benefit of mankind. Therefore, there must be not only some system for establishing priorities within each Institute, but also for all the Institutes, so that the people of this country and their representatives in Congress, can be apprized of specific health research needs, their relative importance, their cost and what could be bought with funds that might be appropriated in the light of all sorts of other needs.

4. Accordingly I propose that Institute directors acting with the advice of their National Advisory Councils assign priorities to the various programs submitted by the special committees on the basis of relative importance as well as on the best possible judgment of the possibility of obtaining an answer. These special programs with their Institute assigned priorities should
then be submitted to the Director of the National Institutes of
Health who with the help of his Advisory Committee would then
have the task of preparing another priority list in the light of
the relative importance of the various proposed programs for
total needs of specific health oriented research. Only when
this stage is reached should the matter be taken to the Congress.
In my judgment the Congress and the public should be informed
of all the collaborative programs that have passed through the
fire of critical judgment. Any appropriations that Congress
would be able to make would then be on the basis of carefully
thought out priorities rather than on the basis of the effective-
ness of special pleaders for some special program. Moreover
in so far as Congress fails to find the money for many of the
needed programs, the people will at least know what they cannot
get unless they are prepared to spend more money.

This is also a good place to state my conviction that if the
people of the United States want to accelerate progress in
specific health oriented research the Congress will have to
appropriate special funds for these programs, because only a
fraction of the total need could come from funds available in
current budgets for specific disease-oriented research projects.
It goes without saying that the people who will have to carry out
the work on the approved programs will not come from some reserve pool of manpower in outer space but from among those already engaged in individual research projects, supplemented by new recruits from the current training programs. Accordingly, it seems to me that Congressional appropriation committees will be justified in asking the extent to which the cost of the new collaborative programs will be covered by items in the present Institute budget, and the Institutes will have to keep this in mind in preparing their regular as well as special program budgets.

5. The success or failure of collaborative, coordinated research programs ultimately will depend on the willingness of scientists to participate in such programs and this in turn will depend on the extent to which they can participate in the original planning and critique of the total research plan and on the extent to which opportunities for individual initiative and ingenuity remain in the cooperative enterprise. This may turn out to be a much more formidable obstacle to the success of collaborative, coordinated programs than getting the money from Congress - unless the working scientists can be properly motivated, given ample opportunities for participation in development of the total research plan and ample opportunities for individual initiative in pursuing identified objectives, and unless they are properly
rewarded with money and academic appreciation for what they are doing.

Many congressional and other special committees have done a good job of analyzing the workings of the medical research establishment both within and through the National Institutes of Health, and all recommendations have stressed the need for more planning and for more so-called "directed research" (i.e. goal-oriented or programmed), and some have even suggested the need for a special breed of full-time executive, the "super" program manager. I would like to submit that nothing could be more prejudicial for obtaining the cooperation of American scientists in urgently needed collaborative and coordinated research programs than the use of the term "directed research" by either the Congress or the National Institutes of Health administrators. What is even more important than the name, however, is the manner in which such programs will be managed. In my judgment the original working scientists committee whose plan for a special program has been adopted and funded should have the major responsibility for managing the program, i.e. assignment of funds to participants, selection of participants and new recruits for the program, actual recruitment with various powers to entice co-workers, frequent discussions of results in progress, and cooperative modification of the total
research plan as new situations arise. Each such group would require not only a tactful chairman from among the working participants but also a full-time executive officer from the Institute that will be responsible for funding and monitoring the program.

In this testimony I have presented to you some ideas for supplementing, not replacing (I stress not replacing), the present procedures for supporting medical research in this country by collaborative and coordinated research programs for accelerating the solution of those problems that are too complex for the uncoordinated efforts of individual investigators. I have the impression that most of the proposals that I made here are in keeping with or close to current thinking among the administrators of the National Institutes of Health, and I hope very much that the scientific community will cooperate in these efforts and that the Congress will be able to find the extra money to fund them.