Pharmaceutical Research, Vol. 12, No. 10, 1995

Editorial

Quo Vadis, Pharmaceutical Sciences, and AAPS?

Brainstorming about the future of one's profession is always entertaining, sure to raise much clamor and debate. General trends may be sketched out to yield a frame-work useful in guiding long-term planning. Noble intentions compel us to define what the pharmaceutical sciences are all about, in search of neat slogans agreeable to all. Yet, I feel uneasy when reading "A Vision for the Pharmaceutical Sciences," AAPS draft language of March '95 anticipating the year 2020. Certainly, it includes worthwhile goals that everyone can adopt, assigning important roles to pharmaceutical scientists in advancing therapy and health maintenance. However, we would all agree that scientific disciplines undergo rapid and profound changes, and more importantly, that boundaries between them shift or disappear altogether. Hence, physiologists and molecular biologists are just as likely to design new drugs as pharmaceutical scientists are to discover the cause of diseases. Hence, when thinking about the potential contributions of pharmaceutical scientists, one would not want to exclude any opportunities in multiple disciplines. As a consequence, the resulting broad AAPS vision statement, with just a few changes, could equally apply to statisticians, biochemists, or psychiatrists. Inevitably, the directives emanating from this vision will be diffuse and possibly counterproductive. Rather, I would like to see a thorough analysis of current and long-term trends in those areas of health care that are most immediately linked to the pharmaceutical sciences. Drug therapy and prevention of disease are obvious central facets of the pharmaceutical sciences, but the same scientific principles can be applied to toxicology, nutrition, and diagnosis. Furthermore, by the year 2020 I would hope for better health of the general population because of improved life-styles, with effective drug use being reduced to one half of the current level of drug consumption. What role will the pharmaceutical scientist play in these developments?

Trends in the Pharmaceutical Sciences

Just a few years ago the prospect of developing novel drug entities was perceived to diminish. As a result, drug formulation development was emphasized and has born fruit in the improved clinical use of many agents, taking advantage of new insights in drug formulation, drug delivery, and pharmacokinetics/pharmacodynamics. However, the new biology and increasing knowledge of the human genome has reversed the decline in discovering novel drug entities. Nobody would doubt today that we are at the threshold of a surge in drug discovery, beginning with biological agents as products of modern biotechnology, and continuing with a rediscovery of the traditional small molecular weight drugs specific for newly identified molecular targets. Therefore, I would predict a gradual shift in focus of the pharmaceutical industry back towards investing heavily in drug discovery, with subsequent drug formulation development continuing to play an essential, but diminished role. Rather than further maximizing the delivery of drugs, one might focus on creating more efficacious drugs to begin with. In parallel, preclinical and clinical drug evaluation will take center stage. Such trends may evolve over decades. Within that time-frame, the human genome will have been fully sequenced, with enormous implications for understanding disease and reorienting drug discovery. We must be prepared for these changes in the pharmaceutical sciences.

Merging of the Biological and Behavioral Sciences

Life-style and the social and cultural environment are arguably the main determinants of personal health, while drug therapy has played an auxiliary role thus far. In Western society, deaths from bacterial infections began to decline precipitously before the introduction of penicillin, because of improved hygiene. I do not wish to belittle the extraordinary impact of antibiotics on the treatment of infections; however, as a result of the emerging antibiotic resistance because of antibiotic overusage, we are now entering the post-antimicrobial era, placing increasing emphasis on prevention through hygiene and vaccination, and probing into the role of psychosocial factors of immunity. Personal well-being, and supportive social environment, may indeed limit frequency and severity of disease, and could well determine the success of any attempted drug therapy. Interactions between the CNS and the immune system are just one example where biologists and behavioral scientist probe the effects of stress, emotions, and social factors on physical bodily functions. I see the merging of the biological and behavioral sciences as a new paradigm essential to improving general health in the 21st century, with drug therapy but one of the tools to intervene under well defined circumstances.

'Overdrugged and undermedicated' aptly describe current drug usage in the US. Possibly, an important role of pharmaceutical scientists, or pharmacists, will be to counsel patients against the use of drugs in many instances and to consider alternative means to maintain or regain health. If drug therapy were indicated, its efficacy may entirely depend on the patient's life-style. Continued consumption of high salt and fat diets, alcohol, and tobacco, combined with no exercise, will doom any attempt at drug therapy of hypertension. Therefore, the pharmaceutical scientist must understand and study drug effects with a holistic view of the patient as a person, not an entity to be analyzed only at the molecular level. What role will the pharmaceutical scientist play in an era where his traditional domain, drug therapy, undergoes sweeping changes, and where the most desirable outcome will be to minimize drug use by maximizing its efficacy?

Public Health Policies

Pharmaceutical scientists will develop new drugs and define conditions for their clinical use, but general impact on

0724-8741/95/1000-1393$07.50/0

health care requires influence over public health policies which profoundly affect public health. Cigarette smoking is legal; yet, it contributes globally to the death of more people every year than were killed in World War II. Ingestion of toxic chemicals, drug addiction, and social behavior combine to cause the gravest, but readily preventable, public health problem. Each scientist and health care professional, regardless of specialty, share the responsibility to shape public health policies, and professional organizations represent the main vehicle to discharge this responsibility.

How is the AAPS positioned to contribute to future trends in the health sciences? This issue can be brought into focus by several more specific questions.

Does the AAPS Currently Represent All Disciplines of the Pharmaceutical Sciences?

In my view, the answer is no. The AAPS focuses on pharmaceutical aspects of drug development, rather than drug discovery, and several other fields are represented only marginally. These include clinical sciences, molecular pharmacology, molecular biology. Analytical chemistry and EMMS are fairly well established in their own rights, as is biotechnology. However, the latter is again heavily focused on drug development, rather than discovery. Undoubtedly, we have members who are experts in nearly all areas of the sciences, but any prominent scientist actively participates in several associations. According to the nature of the scientific results, one chooses the most suitable publication forum. Thus, papers dealing with drug discovery as an example are more likely to end up in journals and meetings of the ACS than the AAPS. To summarize, the AAPS is currently heavily focused on and has extraordinary strength in pharmaceutical aspects of drug development. Yet, its impact in other pharmaceutical science areas is marginal or only now emerging.

Should the AAPS Expand Its Emphasis to Include Drug Discovery?

Given the fact that many of our members are involved in drug discovery, but may not presently view the AAPS as the primary outlet for their work, it would seem natural to answer this question with an unequivocal yes. However, there are very strong competing societies, such as the ACS, which have played a key role in drug discovery for a long time. Could it be possible that by broadening the scope of AAPS, we could weaken the strongest aspects of the association, while not succeeding anyhow in becoming a key player in another hotly contested area? The answer to that question is: possibly.

In a way, we already have made the decision to focus on drug discovery by including it as the main theme for the 1995 annual meeting. I fully agree, not only because of my own interest in drug discovery, but because of the long term trends discussed above. However, this general move must include a full self-evaluation as to the current strengths of the AAPS, and the required resources for implementing a successful focus in drug discovery. It will not suffice to schedule symposia with well known invited speakers, but we would need a sizable number of AAPS members active in drug discovery who also agree that the AAPS provides the proper forum for their activity. If one compares the size of our MNPC section with the Med.Chem. Section of the ACS, one can readily assess the problem facing the AAPS in becoming a main contributor to drug discovery. Only an intensive long-range effort, and the allocation of significant resources of the AAPS, can make this goal attainable.

Should the AAPS Become a Leader in Clinical Sciences and Drug Performance Evaluation?

Again, the AAPS faces formidable competition in these increasingly important areas. Coming from a position of relative weakness as judged by the number of scientists and associations active in these areas outside the AAPS, it would again require extraordinary efforts to establish AAPS as a leader in clinical sciences. Certainly, many aspects of the PPDM section and the small Clinical Sciences Section involve drug evaluation, and there is formidable strength and potential for the AAPS, particularly in preclinical drug evaluation. Nevertheless, in the clinical sciences at large, AAPS is but a small player at present. In the behavioral/social sciences relevant to drug therapy, we have yet to turn the first page. Hence, the AAPS should reflect on the unique perspectives it can provide without the necessity to play a leadership role in advancing all these areas.

Implications for the AAPS

These considerations bear upon the future of AAPS. Any attempts at strengthening AAPS Sections individually may fail even with great effort expended. Rather, we need to rethink the structure and objectives of the AAPS. All AAPS Sections are too rigidly defined along the lines of traditional disciplines, making it more difficult to integrate multiple disciplines. Rather, for creating sections of the AAPS with common objectives, one would like to utilize operational terms, such as drug discovery, drug development, drug evaluation, and the formulation of public health policies. Most of the AAPS specialities would fall into several such categories, leaving it to the individual scientist to choose any primary affiliations with sections. Focus groups are useful in this regard because they respond flexibly to emerging hot spots, but they should be organized in such a way to attract scientists from multiple disciplines. Indeed, focus groups not meeting the criterion of multiple disciplines could further fragment the association by establishing multiple noninteracting groups. Scientists with nearly identical interest will band together anyhow, without the need to provide special resources. The AAPS has to select wisely those categories where it wishes to have the strongest impact, with due consideration of its current assets and weaknesses.

The vision is simple: Endorse drug discovery, development, and evaluation as principal objectives of the AAPS. Do not try to define the pharmaceutical sciences or its subspecialties. Establish an association structure that fosters interdisciplinary research, allowing natural growth to occur without confining boundaries.

Wolfgang Sadée
UCSF, School of Pharmacy
San Francisco, California 94143-0446