THE STATE OF BIOMEDICAL RADIATION RESEARCH AS DEMONSTRATED BY PUBLICATIONS, FUNDING AND MANPOWER ACTIVITY: AN ANALYTICAL EXAMPLE OF UTILIZING ON-LINE MEDICAL INFORMATICS

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The biomedical radiation research community has important goals. Research, risk assessment, preventative health and safety are some of its responsibilities. It is surprising that radiation research is growing only at 70% of the yearly Medline database. Funding is predictably underfunded (89% of expected) given its high percentage of research with animals and cells (127% (Medline = 100%)) vs. radiation's lower percentage of human studies (60%). Manpower studies demonstrate 4500 Ph. D.'s since 1960. 50% are in physics, 17% chemistry, and 11% biology. Biochemistry, pharmacology, microbiology, genetics, pathology and psychology contribute less than 3%. These indicators show activity in radiation research, yet deficits.

Introduction

Biomedical radiation research, safety and the manpower to respond to public needs is a primary function of the radiation medical and research community. The radiation community's ability to respond to these needs is evident in its research, funding, and manpower activities. Many government agencies develop and implement public policy, and the personnel they rely upon are trained within the academic radiation research and medical communities. Strengths and weaknesses within the medical and research communities will ultimately be reflected in government agencies. This study attempts to answer: What is the pattern of interest in biomedical radiation research, public health and safety issues by the radiation community; how well are these issues and biomedical radiation research funding faring given highly competitive research in other areas; where does biomedical radiation research manpower come from, and how will this manpower pool effect radiation safety and research in the future. These coupled with the two historical events of: (1) The ten year anniversary since the inception of the National Academy
What is the question about biomedical radiation research that can be answered by information sciences? We peer review departments, faculty, and personnel by many soft criteria, e.g., personal evaluations. How do we review a field? How do we know a specific field, e.g., chemistry, astronomy, or English, is important? What contribution does it make in advancing its own field, contributing to other fields, or society as whole?

The importance in evaluating a field of study is multiple. The review may help define what the contribution of the field is, and allows some comment on whether it succeeds in its contribution, or what the contribution should be. Further, it may predict areas of weakness, that may be corrected, and future areas of need or opportunity that it should pursue. These analyses have great impact on national science programs, recruitment, education in colleges and post-doctoral programs on man-power needs.

Further, the taxpayer is asking for and deserves an accounting of his tax dollars. How do we protect both the taxpayer and the professionals in the field from undue purview and criticism? Answer: hard data. How do we evaluate this contribution - what are the criteria?

The criteria, i.e., science indicators, are derived from the National Science Foundation. These criteria are based on "hard data" - and a few of them are newly available on computerized data-bases. These data-bases allow a more comprehensive "paper-trail" of how a field is doing, and can give yearly trends.

Science indicators are measurable aspects of a discipline, and include: (1) Scientific literature, including the number of papers and the impact of the publications by citations; (2) Research and development expenditures, and by what agencies, e.g., Public Health Service (the National Institutes of Health), non-public health services, e.g., Department of Energy, or private foundations; (3) Prizes won in the discipline; (4) Patents derived from the discipline; (5) Technology development as proven by goods and services stemming from these developments, and their contribution to trade; (6) Research and development manpower. These parameters can be compared with other disciplines to broaden the interpretation of the indicators. All these indicators impact upon national goals and planning. This present study will only deal with aspects of publication, citation, doctoral manpower, and departmental affiliations that contribute to the field of radiation research.