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EDITORIAL

Our thirst for new knowledge

Our resource limitations in the face of the wealth of studies provided by developed countries should not discourage us from pursuing our own research. Research will not only add to the current volume of information we have but also help us formulate appropriate treatment approaches, preventive programs, or health policies.

Medical research is one of the most potent productive forces in society. Developing novel mechanisms in the understanding and new strategies in the treatment of diseases are the results of endless research and countless studies, both inside laboratories and in clinical settings. The United States (US) National Institutes of Health (NIH) is spending $20.3 billion for research in 2004, apportioned among 27 institutions and centers.[1] The US pharmaceutical industry spent more than $24 billion for Research and Development (R & D) in 1999 for nearly twice the number of biomedical research projects the US government undertook.[2] These expenditures accounted for 20.8% of sales in the industry. From 1985 and 1995, the industry's investments in R & D nearly tripled; they have provided the largest share of all US expenditures for R & D since 1980.[2]

The question may be asked: Why is the US spending so much on biomedical research when expenses for pharmaceuticals make up a small segment of the total daily per capita expenditures of Americans: $0.64 versus $8.45 for housing and $7.94 for food?[3] The answer can be found in the editorial of S.J. Giorgianni[4] in connection with the 150th anniversary of Pfizer Corporation in 1999: "Modern medical technology makes it possible to manage more diseases and treat them more effectively and with greater degree of safety than ever before. As a result, people with chronic or debilitating disease can have their quality of life transformed from merely existing to robust, active living. They live productively within the fabric of society because of research."

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Knowledge and innovation are powerful forces that improve the lives of people. Today's advances in medicine are the results of a forward-looking investment in biomedical research. The global leadership of the US in discovery, learning, and innovation, for instance, rests on investments in fundamental research and education. As proof of this success, the US publishes about one third of the world's scientific literature, the 15 European Union (EU) countries another third, and the rest of the world the remaining third.[5] The US produced the most number of papers in all fields worldwide; consequently its work are the most cited at an average of 13.5 per paper.[6] Among the top ten nations according to output of published journal articles in science between 1992 and 2002[7] as indexed by ISI (Table 1), the US ranked number 1, followed by Japan and Germany.

What factors account for the variations in biomedical research productivity worldwide? Per capita gross national product (GNP) and R&D expenditure were the two most important factors among ten social and economic indicators studied in a multiple regression model.[8] This means that a nation should have the resources and finances to conduct research with major scientific impact. The relationship between national research funding and English proficiency on publication output in developed countries was also studied showing significant results ($p = 0.04$; $p < 0.01$, respectively). These two variables explained approximately 71.5% of the variation in publication rate ($r = 0.85$; $p < 0.01$).[9] Normalized for population size, English-speaking nations and certain northern European countries had the highest rate of publication while Asian countries had generally low rates of publication.[9]

In terms of frequency of citations, the US ranked first, followed by the United Kingdom (UK) and Germany (Table 2).[10] Japan ranked fourth, largely because many of the articles were written in the native language. In ophthalmic research from 1991 to 2000,

the US contributed 51.5%, followed by UK (11.3%), and Japan (6.5%).[11]

Research output of developing countries is lower primarily because of limited government funding. In the Philippines, sources of research funding include university grants, select government agencies like the Department of Health (DOH), local and international nongovernment organizations (NGOs), and local and international foundations. Funds are generally limited to the areas of interest sponsored by these organizations. Another factor affecting research output in developing countries is the lack of investigators with doctorate degrees especially in the basic sciences. In the last survey of the top 20 universities in Asia, none of the universities in the Philippines was included because of low research output and few professors with PhD.[12]

Table 1. **Top 10 nations in research output.**

Rank	Country	Number of Papers*
1	United States	2,702,477
2	Japan	697,468
3	Germany	641,695
4	England	589,894
5	France	475,536
6	Canada	357,199
7	Italy	299,843
8	Russia	264,062
9	People's Republic of China	206,698
10	Australia	205,441

*Published journal articles in 22 main fields of science, based on papers indexed by Thomson ISI between 1992 and 2002.
Source: ISI Essential Science Indicators

Table 2. **Top 20 countries cited in clinical medicine (1992-2002).**

Rank	Country	Number of Papers	Number of Times Cited	Citations per Paper
1	USA	636,932	8,600,922	13.50
2	Great Britain	149,783	1,683,670	11.24
3	Germany	143,293	1,116,097	7.79
4	Japan	143,770	1,083,033	7.53
5	France	102,532	886,302	8.64
6	Canada	70,337	885,042	12.58
7	Italy	77,417	770,101	9.95
8	Netherlands	51,716	670,650	12.97
9	Sweden	42,830	504,669	11.78
10	Australia	43,885	432,168	9.85
11	Switzerland	33,227	382,419	11.51
12	Belgium	25,270	292,120	11.56
13	Scotland	22,357	276,513	12.37
14	Spain	39,633	267,987	6.76
15	Finland	21,217	267,752	12.62
16	Denmark	20,869	260,791	12.50
17	Israel	22,136	180,228	8.14
18	Austria	20,728	173,965	8.39
19	Norway	13,081	137,982	10.55
20	Taiwan	15,203	80,317	5.28

Source: ISI Essential Science Indicators

Our resource limitations in the face of the wealth of studies provided by developed countries should not discourage us from pursuing our own research. Diseases affect different groups of people differently and there may be genetic, cultural, or environmental factors that play a role in the development of certain disorders, which we can identify when we conduct studies among our own people. The same holds true for the effect of some drugs. There are also diseases that may be unique to Filipinos by virtue of certain genetic, environmental, or cultural predisposition. Research will not only add to the current volume of information we have but also help us formulate appropriate treatment approaches, preventive programs, or health policies.

The search for new knowledge is often triggered by a simple observation in clinical practice. The inability to fully comprehend why an event transpired or why an illness arises leads to several questions and the formulation of a research question. If the case is rare or presents in an atypical manner, it may be reported in a widely circulated medical journal. If the case or several cases present as diagnostic dilemmas or management problems, they may lead to further laboratory or clinical investigations. This questioning and searching for answers to understand a particular disease is what leads to research. Medical research will lead to innovative thinking and discovery. The application of scientific knowledge obtained from research will not only improve health and overall quality of life but also educate and inform those who use and benefit from these discoveries.

In this issue, several local studies will give the readers insights into some of the conditions intrinsic to Filipinos. Long-term observation of retinoblastoma (*The Epidemiologic Pattern of Retinoblastoma,* pages 135-138) covering three periods highlights the varying patterns of this disease entity in children and the factors accounting for this change. A study on the different causes of pediatric cataract (*Profile of Childhood Cataract,* pages 139-142) provides an example of how blindness can be prevented in this group of patients and why there is a need to formulate a policy of screening for these disorders. Again, research consisting of systematic observation and deductive thinking led to increased understanding of these diseases.

—The Editor in Chief

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