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Opinion

Three essential conditions to cultivate physician scientists

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Abstract

1) We conducted a workshop to discuss the definition of the term "physician scientist", what thought processes and competencies are expected, and how to better help physician scientists develop through medical schools.
2) The definition of a physician-scientist is a physician who both provides patient care and approaches unsolved questions in understanding the mechanisms of diseases and developing new treatments.
3) Essential conditions for a medical school to cultivate physician scientists include providing good role models for physician scientists, making efforts to stimulate students' motivation, and supporting collaboration among physicians and scientists on the faculty.

Key words: physician scientist, role model, early exposure, collaboration

Introduction

The importance of cultivating physicians who perform both patient care and medical research seems widely recognized. However, both Japan and the U.S.A. are confronting a severe shortage of such physician scientists. In Japan, after a major policy change for the postgraduate training system in 2004, the field of physician scientists seems to be declining[1]. Most medical graduates had been enrolled in a specialty department of university hospitals to do medical practice and research activities after completing medical school until the system change in 2004, which allows them to choose a 2-year-residency program at any teaching hospitals through the nationwide matching system. As a result, fewer graduates are at university hospitals, which in turn suggests that young physicians are losing interest in academic medicine. One hundred eighteen out of 126 U.S. medical schools offer combined MD-PhD programs to strengthen basic medical science efforts[2]. However, the physician scientist population in the U.S. is getting smaller and older than it was 25 years ago[3]. The number of physicians engaged mainly in research decreased from a peak 23,268 (4.6%) in 1985 to 14,340 (1.8%) in 2003.

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On May 12, 2008, we conducted a workshop entitled "Let's discuss how to cultivate physician scientists" at Medical School, Gifu University to explore better ways to nurture physician scientist with emphasis on undergraduate medical education in medical schools. The panel members were the authors including dermatologist, surgeon, pediatrician and parasitologist who are experts as physician scientists: LD, DR, AL, YK, YA, YS, and YT. The workshop was facilitated by NB. The panel members' opinions were first gathered by pre-workshop questionnaire in which they answered to the topic questions (**Table 1**). At the workshop, a discussion was elicited based on the charts in which the results of the pre-workshop questionnaire were collected. Key ideas were noted on paper and attached to the chart. The workshop products are summarized in this report.

Table 1

Questions
1) What is a physician scientist?
2) What mind and competencies are physician scientists expected to have/develop?
3) Medical science responsibility: who perform basic medical research and how?
4) How can we better help physician scientists grow through undergraduate (and continuing) education?

Results

1) What do you think is a physician scientist?

What is the definition of physician scientist? What is the role/the function of a physician scientist?

The basic definition is that the physician scientist is an individual who is simultaneously involved both in clinical practice and in basic medical research. Two Japanese members defined it as a medical doctor providing medical practice, who is conducting or has performed basic medical research. This means that this person can understand the application of the up-to-date sciences to solve clinical problems.

From another perspective, the physician scientist serves as a "bridge" between clinical medicine and basic science research whose ultimate goal is to solve clinically important problems. Some members of the panel emphasized basic science research because all clinicians are or should be involved in clinical research, while some thought that clinical research could also been considered within the realm of defining the physician scientist.

2) What mind and competencies are physician scientists are expected to have/develop?

In addition to medical knowledge, clinical skills, and humanity to care for patients as a clinician, the group concluded that physician scientists should develop research questions in a logical and experimentally-addressable way in order to understand the pathophysiology of diseases and/or to develop innovative treatments. Physician scientists will also need to publish their achievements, and compete successfully for grants.

In regard to social and humanistic aspects, it was suggested that physician scientists should be honest and diligent at his/her work in both research and clinical practice. They would also be doctors who enjoy presenting their work to people, showing what they have achieved in their research. Speaking English may be required to communicate with the international academic population.

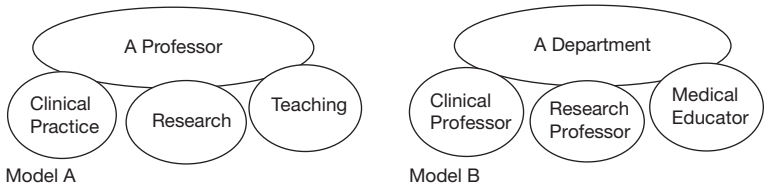

Figure 1 Two models of faculty roles in an academic department. Model A (left) represents a traditional system, where each professor functions as master clinician, researcher and teacher ("the triple threat faculty member"). Model B (right) illustrates that each professor excels in one or two of these areas, together building departmental strength in all areas ("the triple threat department").

3) Medical science responsibility; who do you think performs medical research and how?

Who is responsible for basic medical research to develop medical science for better medical practice? MD? and/or PhD? and how?

Models of tri-functions; clinical practice/research/teaching are shown in Figure 1. Which model do you agree with or what other model can you think of?

A faculty member used to be expected to be an outstanding clinician, a funded researcher and gifted teacher, and this model (Model A) was referred to as the "triple threat" physician. But recently, some forward thinking university administrators seek to include people who excel at one or two of these areas, realizing it is impossible for all people to excel in all three areas (Model B).

In this situation, the development of basic medical research is the responsibility of both the MD and the PhD investigators working in a collaborative way to maximize intellectual interactions. In recent times, many US medical schools follow Model B. There is a small cadre of people in "the middle" between them, the physician-scientists, who can work as effective bridges between the clinicians and the basic researchers. The pure PhD has no way to know the details of clinical medicine, while most clinicians are not adequately trained to conduct cutting edge basic research.

But, three Japanese panel members valued Model A as ideal, discussing some problems with Model B. In Model B, there must be someone who can successfully unite the independent resources for the development of medical sciences because neither specialist: clinical professor, research professor nor medical educator alone can be an ideal role model for physician scientists. Students/trainees wanting to become a physician scientist need to integrate each area of expertise by themselves. In any case, this discussion emphasized the importance of having an excellent mentor /role model who is a physician scientist.

4) How do you think can we better help physician scientists grow through undergraduate (and continuing) education?

What is the best undergraduate curriculum to help students become a physician scientist? How do we raise the motivation for research to develop medical science?

Collaboration between MDs and PhDs occurs at many schools. What factors do

you think are important to foster this collaboration?

This topic was the most emphasized during the workshop. While it is difficult to create people interested in a career as a physician scientist, what we can do is to create an optimal academic environment to cultivate physician scientists. One important component may be financial support. Since medical school remains expensive in the U.S., many medical students graduate with large loans used to support their studies. Thus the federal government has established loan-repayment programs to attract and help medical students interested in biomedical research. Another example in the U.S. is that those who seek to be clinician-scientists can attend for free, or even receive a salary while in school during an MD-PhD program (usually six-years after four years of college). This approach is also applied in some Japanese medical schools including Gifu University.

To foster collaboration, within an ideal arrangement of a department, people need common goals and physical proximity, and frequent informal interactions. A clinical department having a unified goal, for example, to excel in transplantation, would hire a number of outstanding clinical surgeons and immunologists who can interact with the clinicians to solve the clinical problems of transplantation. The trend on many campuses to physically separate the clinical and research facilities may undermine this interaction.

We also addressed the importance of exposure, the opportunity for medical students to see and experience biomedical research. Good role models/mentors could stimulate them to evoke their interest in how to elaborate and solve a question about disease and treatment. A one-year research experience in a medical school program would help the student meet good role models and raise their interest in basic research. Many medical schools have already implemented research programs lasting several months in the basic medical sciences, though it is still unknown how well these programs have motivated students for research careers. However, in reality in Japan, many physician scientist trainees (postgraduate students and senior residents) conduct research in the evening and night after finishing their patient care responsibilities. This arduous lifestyle may have a greater impact on current medical students when choosing their career.

Discussion

During this workshop, physician scientist experts from the U.S. and Japan discussed the definition of the physician scientist and better ways to nurture physician scientists in the future. The workshop products showed 1) that the physician scientist is an individual who is involved both in clinical practice and in basic medical research; and 2) that the essential conditions to help physician scientists grow would include, first, an opportunity for medical students to meet good role models of physician scientists during the undergraduate curriculum; Second, medical schools should develop programs in which early exposure enhances the students' science mind/motivation; Third, medical schools need active collaboration between MD and PhD faculty to attract good role models and to develop their research projects.

Based on this consensus, we hope that each medical school can develop their curriculum and strategies to further cultivate physician scientists. To develop them, important ingredients may include surveying the interest and choice of career of medical students and residents, and analyzing the current situation and its reasons of existing MD-PhD programs in Japan.

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文献紹介

臨床実習が始まり，学生は患者さんから何を学んでいるのか？

Kathryn Bell, Henny P A Boshuizen, Albert Scherpbier & Tim Dornan. When only the real thing will do: junior medical students' learning from real patients. *Med Educ* 2009; **43**: 1036-43.

英国でも医学教育を取り巻く環境に大きな変化が来ている．入院患者から外来（ambulatory）患者へ，そして病院医療からプライマリケアへと病棟での実習が減ってきている．これは社会が患者安全に敏感になっているからである（introduction にこのようなことが書いてあり，英国でも？と驚いた次第である）．また，臨床実習前教育では teaching から learning へと学習スタイルが変化しているのに，臨床実習教育では未だに teaching に重きが置かれている（これもびっくりさせられた文章であった）．それが証拠に，2008 年に real patient learning（RPL）をテーマにした 13 論文ではそのうち 6 論文が学生に焦点が当てられ，たった 3 論文のみが学習アウトカムとその深さについて検討していた．

そこで著者らは，英国マンチェスター大学医学部 3 年生の臨床実習が始まった初めの時期の学生（平均年齢 21.5 歳，女性 60%）にウェッブアンケートを行い，実際の患者さんから何を学んだのかを調査した．学生たちは患者さんから実際の症候や診察所見，専門用語を使うのではなく social language を使うこと，自己信頼感，モチベーション，専門家としての identity，病人の複雑性などを学んでいる．“Real patient learning helped respondents link theory learned earlier with reality as represented by verbal, visual and auditory experiences.”

多くの学生は RPL を肯定的に受け取っているが，一部の学生は否定的な回答をしている．521 学生中の中に次のような回答があった．“On the negative side 16 statements described how RPL made respondents feel confused, ill prepared for assessment, unconfident, scared, “like a lost soul” in the way, or concerned they would become emotionally over-involved. Some respondents were concerned they were invading patients' privacy, patients did not understand why they were there, or patients did not want to speak to them.” このような否定的回答をする学生については今後検討が必要であるが，早期での患者接触はその学生が臨床医になる者としての適性を持つかどうかの一つの指標になるかもしれない．

（福島　統）