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## Can students and practising doctors be encouraged to do medical research and should they?

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DAVID WOODS

The chance to generate new knowledge, to resolve medical problems, to benefit mankind — perhaps even to acquire in the process a Nobel Prize and a measure of immortality — ought to make medical research a popular, even glamorous, endeavour.

But among Canadian physicians and medical students it's rarely perceived that way. At the annual meeting of the Royal College of Physicians and Surgeons earlier this year, participants in a seminar on research agreed that there's a need to promote the idea of research as early as possible in medical training. One panellist, Dr. Robert B. Salter, professor and head of the University of Toronto's department of orthopedic surgery, said students must develop "constructive discontent" about the state of knowledge in any given field; another, Dr. Ernest A. McCulloch, director of the U of T's institute of medical science, said that not enough physicians are pursuing research careers because there's a perception among medical students that research is "narrow, slow, dirty and inadequately funded, offers few opportunities and is conducted by sterile, reference-quoting people."

More recently, both Drs. Salter and McCulloch offered further comment on the present status and image of research and on the apparent need to sell it.

While it's always been necessary to expose students to the existence of research opportunities, says Dr. Salter, the need is greater now because undergraduates hear and read about budget restrictions and could

become discouraged even before they embark on a project. "You have to point out to them," he says, "that there *is* money for well-planned, exciting, meaningful and original research."

But it's not only a question of reassuring potential researchers that funding can be found; many are confused about the application process, or about which of the several agencies they should approach. Some may be deterred by a notion that the scramble for financing is fiercely competitive; they have to be taught where to begin.

### Researchers are detectives

Dr. Salter, an eminent researcher himself, believes strongly in igniting students' interest in research and fuelling their idealism and scientific curiosity as soon as they enter medical school. He gives them an introductory lecture that transmits his own enthusiasm for what he calls the fascinating "detective work" of research.

What that involves, he explains, is being acutely observant, asking intelligent and appropriate questions, gathering all the clues or data and drawing valid conclusions to solve a given mystery. Describing his "surgical research cycle", Salter says this begins with an unsolved clinical problem in man; the next step is to ask the right questions about it, and then to develop a working hypothesis — a well-reasoned theoretical answer. After that come the protocol, design, method, subjects and equipment for the investigation. Finally comes in-

terpretation of the data to answer the original question.

This cycle, says Dr. Salter, helps young or beginning scientists stay on track. He notes that a physician's "inherent reverence for human life and comfort . . . dictates that he must confine experimental investigations to animals, and furthermore, that any proposed clinical investigations in humans must be morally and ethically acceptable . . ."

But good clinical investigation, he believes, can elucidate the cause of a disease, reveal areas of inadequate knowledge and persuade a researcher to ask the basic question and thus get onto the research cycle with experimental work. As the president of a British pharmaceutical company is reputed to have said: "You can't ask mice if they've got headaches."

Noting that "art is I; science is we", Dr. Salter says that the stereotype of the researcher as a determined individualist working in solitary confinement may once have had some basis in fact; these days, though, with research becoming ever more sophisticated, collaboration is essential. In his own work in Legg-Calvé-Perthes disease, which involves new techniques in hip surgery and regeneration of cartilage, Dr. Salter collaborates with people from such disciplines as bioengineering and biochemistry, and they, he says, become *part* of a given project — not simply resource folk or consultants. "They must be in on it at the planning stage," he says, "and the principal investigator must stimulate their interest. Kudos goes to the team."

Asked about serendipity in research — stumbling by chance upon a solution — Salter says that while, obviously, there can be lucky breaks, they're more likely to present themselves to the prepared mind, the researcher who "expects the unexpected." The essence of research, he says, is to make the theory fit the facts, not the facts fit the theory; if the investigator looks at the data only to prove the hypothesis he'll miss the chance for chance — or serendipity.

Rather like scaling Mount Everest for no other reason than "because it's there", Salter sees the quest for knowledge as self-perpetuating. The true scientist, he believes, continually looks for new peaks to conquer; the more questions he answers, the more come along to take their place. That's why the orthopedic surgeon sees a spirit of discontent as being an important qualification for the researcher . . . a mixture of dissatisfaction and inquisitiveness, a compulsion to ask Why and How. Most students — in any field — tend to accept dogma without questioning it, says Salter.

As for practising physicians getting involved in research — well, perhaps there's a need for some research to make that theory fit the facts. The facts are that a mere 3% or 4% of practitioners are engaged in research, but Dr. Salter considers there are many important questions that could be answered by clinical and epidemiologic studies; there should be an opportunity for everyone in medicine to ask them.

### Challenging the status quo

But if practising MDs aren't asking Why and How — at least, seemingly, not often — there's a danger not only that accepted habits (such as keeping postcoronary patients in bed for 6 weeks) remain unchallenged, but that medical students might gain the impression that all the questions have been answered; that there's nothing left to do.

When he was president of the royal college, Dr. Salter established an RCPS advisory committee on research and wrote to Prime Minister Trudeau about research funding through the Medical Research Council. He says the symposium at



**Lucky breaks in research are more likely to present themselves to the prepared mind.**

this year's annual meeting was the first of several that will address national research issues.

At that first symposium, MRC President Dr. René Simard described the council's efforts to encourage research among medical students and practising doctors — summer scholarships, fellowships and a grants program which, he said, will be the backbone for medical research in Canada.

Another of the panellists on that occasion was Dr. Ernest A. McCulloch, a research hematologist at Toronto's Princess Margaret Hospital, a professor at the University of Toronto and director of the university's institute of medical science. He made the analogy that research is "like sex — you learn by participating, not by reading."

However, a glance at any of the several surveys of college students' sexual proclivities suggests that it's not a very persuasive parallel. As Dr. McCulloch said in an interview at Princess Margaret Hospital: "We've been poor at generating a sense of excitement (about research)."

McCulloch referred to a questionnaire given to Toronto medical students when the university planned to set up an educational program in research. The responses, he says, tended to be more favourable from those students who had had some experience of research;

the majority, he feels, are turned off because the undergraduate medical course is arduous enough as it is. They already feel "oppressed by the weight of information" they have to absorb, without seeking out more. Dr. McCulloch considers, though, that the generally conservative manner in which data are presented may tend to promote ready acceptance rather than challenge, inquiry or scepticism. He believes, however, that students do get pretty good at making decisions and developing a healthy cynicism. "What's lacking is an appreciation of the exception that leads to challenging accepted concepts — 'this patient doesn't fit what I've been taught; have I been taught wrongly?'"

Like Dr. Salter, McCulloch sees the researcher as being by nature a revolutionary. But to be successful he must be highly professional; he must develop methodology to a fine pitch and know unerringly what's relevant. The amateur, he says, sets out to prove something; the professional sets out to answer a question. Clinical trials should be designed with a question that's sufficiently important that the answer should be published even if it's negative.

Without research, McCulloch believes, medicine would become ritualistic. As for the apparent need to "sell" research, he says that what's being sold to students isn't research — it's the opportunity to see whether they'll like it. The research experience under supervision is so important.

Defining serendipity in research as "the action of chance on the prepared mind" (cf the dictionary's "the faculty of making desirable but unsought-for discoveries by accident"), Dr. McCulloch says he tells students to question everything they believe.

He also doesn't hold with the eureka concept. In general, says McCulloch, the introvert-in-the-back-room stereotype doesn't fare too well in research. A large part of investigation is communication with people.

How would he encourage practising MDs into research? "Make sure some proportion of their reading relates to research articles — not just reviews, but specific reports of research activity in areas where the individual has an interest." ■