

## The modern scientific physician: 8. Educational preparation

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The purpose of medical education is, of course, to make the student into a physician — the now-common definition of which is a person authorized to practise medicine.<sup>1,2</sup> Medicine is now defined as “the art and science of the diagnosis and treatment of disease and the maintenance of health”<sup>1</sup>; as “the art of preventing or curing disease”<sup>2</sup>; or as something else along those lines.

In the educational preparation for a career as an expressly scientific physician, as a practitioner of scientific medicine, the beginning must be an intellectually tenable conceptualization of medicine itself, its essence. Different from those definitions above, modern medicine no longer is “the” art of anything, and never has medicine been “the,” or even a, “science” of something. Modern medicine is an aggregate of arts — professional disciplines, *specialties* of medicine. These disciplines are not concerned merely with the “disease” (Latin *morbus*) segment of ill-health — illness — but, notably, with defect (Latin *vitium*) and injury (Greek *trauma*) as well; and an added concern is sickness not manifesting illness. Intervention (“treatment of disease,” etc.) is not inherent in medicine. For, intervention broadly has not been, and even now may not be, available even; and if available and calling for a professional or a technician, its execution can be delegated to a doer, just as diagnostic testing can be. Also to be understood is that writing a prescription is not an intervention: its associated intervention is the client’s follow-through, if any, with the prescribed use of medication (cf. recommendation of surgery v. execution of, or submission to, surgery). The first concerns in medicine are cognitive, having to do with illness or sickness (present, future) in the individual or morbidity in the community, that is, in the client that the practitioner is caring for — with the effects of possible prospective interventions, if any are available, among these concerns. The first concerns thus are ones of *gnosis* — not only “diagnosis” but etio- and prognosis also. Gnosis, however, is not a concern per se but only the inescapable prerequisite for a physician’s functioning in his/her outward, genuinely definitional role: not as an intervener but as a *doctor* — teacher, that is. When the teaching is about intervention, at issue is not either “preventing” or “treatment”: the intervention can be a rehabilitative one; and when treatment — therapy — is the topic, the intervention may not be one that supposedly is “curing,” curative: it can be caring in the sense of being palliative.

In the educational preparation for a career as a scientific doctor in one of the medical disciplines, the student needs to

proceed from a tenable concept of medicine itself to other, almost equally important, tenable concepts in medicine (together with their associated terms). Centrally concerned with gnosis, the genuinely scientific future physician would thus be educated, among other things, not to confuse rule-in diagnosis (resident in his/her mind) with the case of illness it concerns (resident in the patient’s body), etiognosis with etiology itself (much less with epidemiology), or prognosis with the future course or outcome of the patient’s illness or the community’s morbidity (much less good/bad prognosis with favourable/unfavourable future course or outcome); and of course, (s)he would be educated not to confuse the knowing (particularistic) that gnosis represents with the knowledge (abstract) on which it depends, to say nothing about confusing the ad hoc inquiry toward gnosis with its general counterpart in gnosis-oriented research. On an equally elementary level, (s)he would learn not to mistake diagnostics or screening regimens (their deployments) to be interventions, with effectiveness their useful property. On and on.

Upon mastering the essential concepts (and their associated terms), the future practitioner of scientific medicine would be in a position to learn the essential *principles* of such practice, thus rounding out his/her education in the theory of medicine. Most notably, then, the theoretically well-rounded future doctor, in his/her practice, would eschew the ideology of today’s Evidence-based Medicine movement,<sup>3</sup> replacing this by the ideal of *knowledge-based medicine* — in which gnosis is based on the specialty’s best knowledge inputs in logically tenable theoretical frameworks. In this spirit, (s)he would readily accept presumably competent *guidelines for gnosis*; but decision guidelines (s)he would mostly reject — as representing contraventions of one of the fundamental tenets of praxeologic theory.<sup>4</sup> And the putative conflict between genuine care and cost containment would be resolved just the same: while “immense integrity” is the first-order virtue of a scientist,<sup>5</sup> this requirement applies equally to the scientific practitioner — and it is, in fact, central to medical professionalism in general. Thus the student would come to understand that (s)he would be caring fully for the clinical client when conveying the whole truth, including what diagnostic uncertainty (s)he is left with due to the payer’s constraints on the reimbursement of testing costs; and in prognosis, what prospective gain in ‘health’ remains unattainable due to lack of reimbursement for the medically ideal intervention. This also holds for community medicine.

If the prospective graduate, to be authorized to practise medicine, actually aims to conduct practice-relevant *research* (without authorization), notably directly practice-relevant, gnosis-oriented research, then the necessary preparation also involves study of the concepts and principles — theory — of such research, building upon the requisite background not only in the lingua franca of science (English) but also in probability theory and theoretical statistics, logic and the philosophy of science. The same applies, even more forcefully, to those whose aim is to conduct *reviews* and meta-analyses of the evidence from such research and/or the promulgation of knowledge based on the aggregate of direct evidence.<sup>6</sup> This education richly disabuses any future science-authority, on practice, of “the comfortable notion that science is common sense organized.”<sup>7</sup>

Much more than the theory of medicine goes into the educational preparation that is of shared relevance for all specialties of medicine, studies under what I like to think of as *the medical common*.<sup>8</sup> Of particular note, among these medical *studia generalia* might very well be introduction to the prevailing specialties of medicine, to aid the student's choice among them — and, where possible, to justify them. But it is the study of the theory of medicine that in the medical common constitutes the critical preparation for expressly scientific practice.

Education in the theory of medicine is not, alas, yet a part of the educational preparation toward practising as a scientific doctor. In all essence, today's medical academia does not have even the concept of practice-guiding theory (Aristotle did), much less the specialty expressly concerned with the development and teaching of this. ‘Clinical epidemiology’ is now emerging as a precursor of sorts for the theory of medicine, the concept of it remaining quite unsettled<sup>9</sup> while, remarkably, some of its leaders expressly refrain from defining it.<sup>10</sup> In the main, though, ‘theoretical’ subjects in today's medical education are still taken to be sciences such as physics and chemistry, anatomy and physiology, microbiology and immunology, pharmacology and toxicology. And as for these, the Flexner-codified idea was not that they in themselves are relevant for the practice of scientific medicine. Rather, the idea was that nondidactic, participatory study of these sciences serves to develop in the future practitioner the scientist's general patterns of rational, methodologic thought,<sup>11</sup> putatively essential for scientific practice under the wholly untenable, even for its time downright absurd predicate that “investigation and practice are ... one in spirit, method and object.”<sup>11</sup> The study of those sciences in modern medical ‘education’ actually became (different from the original idea) rote learning only, crowding the student's mind rather than developing it to the genuine end of medical education: readiness, immediately upon graduation, for fully competent humdrum practice of one of the arts of scientific medicine. Recent innovations in curricula have, however, served to alleviate this problem.

The practice-relevant *substantive* studies are, of course, highly differentiated according to the student's chosen spe-

cialty. For this preparation to be efficient and in its ultimately relevant respects thorough, the future specialty/subspecialty practitioner would not engage in the now prevailing absurdity of educationally retracing the historical evolution of this specialty/subspecialty (unspecialized medicine > specialty > subspecialty > subspecialty); (s)he would enter the ultimately relevant substantive preparation directly upon studies in the medical common, bypassing any ultimately irrelevant educational content.<sup>8</sup> After all, Hippocrates' *vita brevis est, ars longa* maxim is vastly more compelling today than it was in his own day. Focus on only the ultimately relevant studies naturally would lead to authorization to practise in the student's specialty/subspecialty only — an educational goal-limitation that licensing authorities do not yet allow. Regardless, the substantive studies are preparatory to expressly scientific practice only to the extent that they are about gnosis-relevant knowledge derived from medical research — and to say it for the last time, not evidence from research for its subjective interpretation but indeed scientific knowledge (intersubjective) derived from the evidence. Critical for practice is only to know *about* (*kennen, connaître*) the truly practice-relevant objects of knowledge; to know (*wissen, savoir*) them is not necessary.

In the series of short essays that this piece concludes, the concept of scientific medicine is profoundly different from that in the Flexner report almost a century ago; and its associated vision of the requisite educational preparation differs accordingly. The Flexner-codified vision represented the power elite's orthodoxy for its time, and therefore it readily became the dominant reality — by the establishment simply closing the then-common “empiric,” and thus not “scientific,” schools of medicine (of medical “quackery”). Reason now calls for a radical departure from the Flexnerian status quo,<sup>8,12</sup> this call being, for our time, a heterodox one.

Hoping for the called-for progress may appear to be futile, because with previous hopes it has turned out that “the dream of reason did not take power into account.”<sup>13</sup> But hope we must; for “when people accept futility and the absurd as normal, the culture is decadent.”<sup>14</sup> And in particular, coming to understand the genuine essence of scientific medicine and its implications, inclusive of the nature of its requisite educational preparation, must not take away from our professions' commitment to scientific medicine — not merely as a dreamy ideal but as a practical pursuit.

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## References

1. *Dorland's illustrated medical dictionary*. 28th ed. Philadelphia: WB Saunders Company; 1994.
2. *Sedman's medical dictionary*. 26th ed. Baltimore: Williams & Wilkins; 1995.
3. Sackett DL, Richardson WS, Rosenberg W, Haynes RB. *Evidence-based medicine. How to practice and teach EBM*. Edinburgh: Churchill Livingstone; 1998.
4. von Mises L. *Human action. A treatise on economics*. 3rd ed. Chicago: Contemporary Books; 1966. p. 10.

5. Bronowski J. *The ascent of man*. Boston: Little, Brown and Company; 1973. p. 144-8.
6. Miettinen OS. Evidence in medicine: invited commentary. *CMAJ* 1998; 158(2):215-21. Available: [www.cma.ca/cmaj/vol-158/issue-2/0215.htm](http://www.cma.ca/cmaj/vol-158/issue-2/0215.htm)
7. Barzun J. *From dawn to decadence. 500 years of western cultural life. 1500 to the present*. New York: Harper Collins Publishers; 2000. p. 750.
8. Miettinen OS, Flegel KM. Medical curriculum and licensing: still in need of radical revision. *Lancet* 1992;340:956-7.
9. Last JM, editor. *A dictionary of epidemiology*. New York: Oxford University Press; 1995.
10. Sackett DL, Haynes RB, Gyatt GH, Tugwell P. *Clinical epidemiology. A basic science for clinical medicine*. 2nd ed. Boston: Little, Brown and Company; 1991. p. xiv.
11. Flexner A. *Medical education in the United States and Canada*. Bulletin no. 4. New York: Carnegie Foundation for the Advancement of Teaching; 1910. p. 53-4, 56.
12. Rae A. Osler vindicated: the ghost of Flexner laid to rest. *CMAJ* 2001; 164(13):1860-1. Available: [www.cma.ca/cmaj/vol-164/issue-13/1860.asp](http://www.cma.ca/cmaj/vol-164/issue-13/1860.asp)
13. Starr P. *The social transformation of American medicine. The rise of a sovereign profession and the making of a vast industry*. New York: Basic Books; 1982.
14. Barzun J. *From dawn to decadence. 500 years of western cultural life. 1500 to the present*. New York: Harper Collins Publishers; 2000. p. 11.

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