Molecular medicine: trendy title or new reality?

For years, we molecular biologists have been claiming in our grant proposals that the outcome of our research will have an impact on medicine. This has been almost true—a white lie. Knowing how a cell responds to an external stimulus is certainly important for anybody wishing to cure a disease in which that stimulus has a role. But in fact, our work usually stops at least one step before the reality of the clinic. Our primary interest is in the generation of new knowledge, and we believe that this knowledge will then inevitably create other, more palpable benefits.

However, as the cost of research increases, we are aware that we have to explain more explicitly why we should get more money—what will be the payback for society? The slightly circuitous argumentation outlined above is not fully convincing, and it is indeed missing out on a new reality. The first phase of biomedical and biotechnological research might have been better called ‘molecules for medicine’. But a real paradigm shift is taking place to integrate research in molecular biology and the medical communities. In fact, an increasing number of institutes, departments and programmes have labelled themselves ‘molecular medicine’ during the past few years. As with all trendy developments, there are some genuinely new approaches, as well as merely repackaged products that do not bring about any fundamental change. Nevertheless, this new development is really exciting—in fact it is revolutionary—as it requires changes in the mindsets of two communities, physicians and scientists.

To integrate the new research in molecular biology into the clinical setting, the medical practitioner must shift from making a diagnosis based on symptoms to one based on factual evidence. This is not an easy undertaking for some. To put more faith in data from some new fangled analysis from the pathology laboratory than in personal and accumulated experience is a

challenge. There is no denying that new information of crucial importance is coming from research and technology. DNA-array-based analysis is only beginning to prove its value, but already these arrays help to evaluate the prognosis of different patients with the same symptoms. This is a crucial and highly promising change. Instead of considering a cancer patient's statistical survival probability when planning treatments, personal DNA arrays have the potential for a greatly improved classification of patients and will thus allow a prediction of the optimal treatment for the individual. This might suggest that maximum doses of chemotherapy and radiation treatment are the only way forward—or, almost miraculously, that no treatment is needed. If these early indications prove to be beneficial, then the direct link between the molecular and medical worlds will become obligatory. It would certainly require considerable retraining, as well as changes in the medical curricula. Also, there would be a major cost consequence, as chips for DNA arrays are not yet a commodity, although they could become so if the market expands significantly.

Such successes in turn stimulate, and indeed validate, the research directions of scientists. There are many diseases and treatment combinations that need to be analysed, fingerprints of transcribed genes to be defined under different circumstances, and clinical consequences to be deduced. This, of course, requires close contact with medical doctors, because they have a profound knowledge of the diseases they specialize in. The early phase of this new development merely consisted of getting some biopsy material for analysis. Now, it is becoming essential and mutually rewarding to have closer contact, and form a genuine collaboration between doctors and biologists. The experiments that scientists perform will be more incisive, and the analysis of the outcome will be more relevant and more likely to be introduced into

practice. But these interactions do not, and should not, be restricted to DNA arrays. Scientists are now closer than ever to experiments that might bring new treatments to the clinic. These may be novel uses of inhibitory RNAs, variations on inhibitors of cellular components that were not previously thought to be of relevance to a particular disease, designer compounds built to match a protein structure, novel diagnostics, and so on. Scientists are often surprised to learn from clinical colleagues that a relatively general-impact compound can be an effective medication, because we are so accustomed to the ‘lock and key’ model in which only a precise compound is thought to be safe and effective. The medical community has not had the luxury of such precision and has learned how to obtain results by modifying the use of these compounds, for example by changing their dosages and delivery modes. Working closer together will allow both parties to identify improved therapies.

All of these developments point to a need for better communication. The data that represent breakthroughs in science are traditionally published in journals that might not be found in the coffee rooms of clinicians, and the problems of clinicians that may be addressed by scientists are probably not on the keyword list that the latter use to scan the literature. EMBO, and many scientists we work with, are already making this transition towards a joint approach to research in molecular medicine. Both *EMBO reports* and *EMBO Journal* are high-quality scientific journals and already have a steady stream of medically relevant papers. But we would like them to become more broad, such that they function as a meeting point for those who consider themselves to be molecular medical scientists. Consider this as an invitation. We look forward to seeing changes in our content that will match this important development.

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