A mover in the biomedical community

An interview with Harold Varmus, President of Memorial Sloan-Kettering Cancer Center in New York City and former Director of NIH

EMBO reports (ER): After you became President of Memorial Sloan-Kettering, you said that you planned to encourage the development of the biotechnology industry in New York City. But the North-East coast from Boston to Maryland is already a centre of biotechnology. New York City so far has been strong in financing, advertising and media but not in biotechnology. So why should New York City be particularly attractive for investors in biotechnology?

Harold Varmus (HV): The relationship between basic research and industry has been changing everywhere over the last few years. Results from basic research have been more easily brought into commercial application, and the speed with which our results can be applied is increasing remarkably. In addition, the biotechnology industry itself is doing very exciting work that we depend upon, so it's a two-way street in a way it wasn't before. New York is indeed notable in having a very high ratio of academic research to industrial research. In most other places this proportion is more evenly balanced. Part of the reason why there has been very little commercial development here is a general perception that the government and commercial bodies are not interested in biotechnology; we need to change that. As you say, New York is a centre for many things, so some people feel that biotechnology can go elsewhere. But in fact, there is every reason to believe that we can develop things here so as to provide a much better outlet for scientists and a source of jobs for scientists trained here who want to stay in New York City. It makes a more vital atmosphere for biomedical research if we have biotechnology right at hand. Many of our academic research institutions are on the East River, and some of the best places to

develop biotechnology are also on the East River. We envisage an industrial park with academic centres on the Manhattan side and biotechnology developments in Queens or Brooklyn and a ferry service to allow very quick transportation.

ER: So what are your plans for getting investors interested in the New York City area?

HV: Many investors are very eager to have things happen. There are three important features that are moving things forward, although perhaps not at a pace comparable to, say, the Arizona desert,

potential to build a large biotechnology facility in Queens West through a public/private partnership, just across the East River about 5 minutes from the MSKCC.

The third major factor is venture capital. Some firms have come to us to express their interest in financing such an effort. You know that New York has deep pockets, and people are looking for new places to invest their money, especially now that the dot.com industry is declining. People recognise in this post-genomic era that there are going to be opportunities for investing in biotechnology. I think these

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where things are very easy to build. Things happen more slowly here, but they can happen if we're patient and allow them to happen. There are at least three reasons to develop biotechnology in New York City. First, the strong interactions among the major academic institutions in New York that do biomedical research, such as MSKCC, Cornell Medical School, Rockefeller University, NYU, Einstein Medical School, Columbia University and Mount Sinai Medical School. All of these places are now working in a very collegial fashion. For instance, we've met together on several occasions to talk about the best way to attract biotechnology to the area and to build facilities that will allow the growth of biotechnology here.

Secondly, there are already at least three major development projects under consideration or in progress. The most advanced is the Audubon development at the Columbia Medical School. There is an effort to establish a major biotechnology centre next door to NYU on the old Bellevue Hospital site. And there is the

companies, many of which want to guarantee the financial security of New York by further growth and commercial development, realise that there is an opportunity here that has been missed over the years and that can be seized in this decade.

ER: One of the problems with biomedical research has been intellectual property protection that has pitted academia against the biotechnology industry. How could such problems be addressed in the future?

HV: I wouldn't say that this was a simple question of the biotechnology industry versus academic research. Both sectors may appear in different instances to be overly protective of their materials or findings. Sometimes, the academic sector seems to be more responsible for the difficulties than the commercial sector. In the commercial sector the issues are obvious. You're in business, and so you want to protect your property. The difficulty is that in the academic sector, people are very ambivalent and have different points of

interview

view on why they are doing academic research. I think that has damaged research to a large extent, because people are sometimes overeager to try to make some money out of a discovery that most of us would view as simply the product of government-funded research, constituting a research tool that everyone should be able to use.

ER: So, as academic institutions try to establish biotechnology in New York, how would you make sure that patents filed by biotechnology companies will not hamper academic research at the institutions that helped to establish these companies?

HV: First, we are not funding biotechnology. Let's get that straight. Venture capital is funding biotechnology, not academia. The academic institutions are only encouraging the development because we provide a very important interface between academia and industry. We expect biotechnology companies to be talking to us, collaborating with us, hiring our postdocs after they graduate. We expect to be generating ideas that they find useful. But that's what government-supported science is for in general, to advance discoveries in biology so that the industrial sector can pick them up and make products. That's the way it's supposed to work.

ER: But as you said, some people in academia are already upset about some

would not change simply because we have a biotechnology industry here.

ER: On a related matter, how do you con-

sider the agreement between Celera and *Science* magazine about the publication of Celera's account of the human genome?

HV: That's a totally different issue. I'm not going to talk about the Celera agreement here, except to say that it raises some serious concerns about what publishing means. Fortunately, there will be a workshop in the fall about these issues at the National Academy of Sciences to try to

ER: About electronic publication, one of the demands that many people in research have is to free the scientific literature from the commercial publishers.

HV: I wouldn't put it that way. No one is trying to free anybody from anybody. What we are trying to do is make the scientific literature more available to the scientists who made it and use it, taking advantage of the great changes provided by the Internet. We think publishers carry out an important function by reviewing, editing and distributing reports, but the question is: what is adequate compensation for those efforts? The other question is: how do we make optimal use of the electronic world? The current method is lousy. Too much money is being made by some publishers for producing poor journals. But the deeper problem is that we're not taking advantage of the electronic mode of distribution to make the scientific community able to use the

results of research in the most efficient way and to present the results in the most useful way. First of all, publication has to move from paper to an electronic format. I think everyone agrees with that. Secondly, an electronic format provides an opportunity for changing the whole business plan. These changes will have to occur slowly, but eventually I believe that the costs of electronic review and publication can in most cases be absorbed by authors. After all, the authors are scientists who pay publication costs now through subscriptions, page, photo and reprint charges, and indirect costs to libraries, at least in America. Furthermore, I believe it will be possible to provide the material—at least primary research reports—free for everyone in the world. There are at least three initiatives that are under development. The first is to try to develop an international electronic archive for free access to primary research reports. There is one

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intellectual property protection, so how would you avoid such problems?

HV: My concern is that academics are overvaluing their discoveries. People who are in the commercial sector should place as much value as they can on their discoveries and try to get what they can back financially. But academics should have a different set of values. Most of my colleagues at academic institutions feel the same way; we want to maintain our academic standards and we want to encourage people to make discoveries that are useful. If we discovered a drug that looked promising in the treatment of cancer, of course, we would take out a patent on it. That's what has been done in academia for years, and we are encouraged to do so by the Bayh-Dole Act. This

look at many cases in which it appears that the results of the study are not being made fully available to readers. I think one has to be conscious of the distinction between publication as revelation and publication as advertisement. You give up some control of information when you publish,

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and you don't need to when you advertise a product. I'm not arguing that that is what Celera has done in this case, but you have to be very clear about what the extremes are and then decide what kind of practices we are willing to accept as a community.

such archive now, and that's at PubMed Central at NIH. We'd all like to see multiple sites and mirror sites so that we can feel secure about the repository and foster software development. That hasn't happened yet but we do have one site that works well.

interview

ER: But you haven't been able to attract many journals to the PubMed Central site so far.

HV: Well, the fact is that there are quite a number of journals available in PubMed Central, and some of them are very important. If you go to PubMed, which everyone does, and you see that the paper you want to read is in *PNAS* or *Molecular Biology of the Cell* or *BMJ* or several others available there, you just click on it and you see the paper in its correct form, without any need for personal payment or institutional license—barrier-free access for anyone anywhere in the world with an Internet connection. That's a tremendous step forward.

The point is that PubMed Central works, it's growing, and it's going to be made more effective by the recent development of better software and electronic-only journals that offer free access. The BioMed Central collection of journals is one such important

the many services we provide for journals—authoring, subscribing, reviewing, editing—only to those journals that are providing

their content. There are now over 10 000 signatures from over 100 countries on this pledge.

The third initiative is to put the older

that supports publishers who demand only small fees for subscription?

HV: I sympathise with their outlook. I also sympathise with the J-STOR initiative. For science, I hope that we can avoid the institutional subscriptions that J-STOR requires. That would also be fair for developing countries. One thing that separates the First World from the Third World is access to journals. But now we have a tremendous possibility to make science truly international. For instance, a parasitology institute in Shanghai has one of the best parasitology libraries in the world so people come from all over Asia to use it. With electronic publishing, we would have an even greater amount of literature available to every scientist in the world even if they cannot afford the

subscriptions to these journals. This has wide consequences, particularly for medical research. Much of the research we do has an immediate impact on public health, so governments have an obligation to make this research available to everybody.

ER: You are also in favour of BioMed Central, a private electronic publishing initiative. What is the relationship between the private BioMed Central and the public PubMed Central?

HV: BioMed Central is a very exciting experiment by Vitek Tracz of the Current Sciences group—a free access electronic journal that places its papers, after review and acceptance, directly into PubMed Central. As I mentioned earlier, my own

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vehicle. I've just had a paper reviewed and published there and I have to say it was an enjoyable experience—very rapid. I know that the article is fully available to everybody, and if someone does a PubMed search they'll find our paper, click on it and see the full text. So that's wonderful.

The second thing we're trying to do is encourage the scientific community to urge publishers and societies and editors to make their journal contents available 6 months after publication through PubMed Central or any other freely accessible archive. Evidence indicates that journals do not lose money when they provide their content for free 6 months after publication. Nobody is going to give up a subscription to an important journal that they can't see for 6 months. Those of us who feel strongly about developing such a Public Library of Science (www.publiclibraryofscience.org) are willing to take a second step: sometime near the end of this year, we will provide

material that is not in electronic form in an electronic archive. Increasingly, scientists and students are reading only what is available electronically. Literature that is not available in this way is not going to be read. We think it would cost about \$100 million to get the 300 most important

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journals over the last 30 years into this electronic database, and we are seeking ways to raise the funds.

ER: Why have reviews so far been excluded from PubMed Central?

HV: In an ideal world, we would have reviews too. But we're most concerned about primary research papers.

ER: With regard to scientific publishing, what do you think of the SPARC initiative

laboratory has had an excellent experience publishing there recently, and it illustrates the attractions of the new world of publishing that we are about to enter.

ER: Dr Varmus, thank you for the interview.

The interview was conducted by Holger Breithaupt.

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