Someone who should have won a Nobel Prize

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The 2008 Nobel Prizes will be announced next week, starting with the Nobel Prize in Physiology or Medicine on Monday. There will be a live webcast on Monday at 9:30 AM GMT for those interested[1]. As every year just before the announcement, speculation about this year's winners is in full swing. M. William Lensch, here on Nature Network correctly predicted last year's winners[2], and this year he is trying it again[3]. Thomson Reuters uses scientific methods for their predictions (including citation counts over 30 years and other awards), and they nominate[4] these three discoveries:

- Toll-like receptors and innate immunity
- the role of microRNAs in gene regulation
- the development of meta-analysis and application to clinical medicine

There will be of course many more blog posts about the Nobel Prizes this week, both on Nature Network[5] and elsewhere. But in this blog post I want to talk about someone who will not win a Nobel Prize, but who would very much have deserved to do so. I am talking about Judah Folkman who invented the field of angiogenesis research and worked on it for more than 35 years. But the prize can only be awarded to living people, and Judah Folkman passed away this January. A Nature obiturary[6] and recent PNAS article[7] summarize his life and scientific achievements. Here I want to explain my personal reasons why I think he would have deserved a Nobel Prize.

Angiogenesis reseach is hypothesis-driven

Folkman first published his concept of tumor angiogenesis in 1971[8]. He postulated that the recruitment of dedicated blood vessels is essential to tumor growth. It took 25 years of experimental work by Folkman and others until the concept of angiogenesis became widely accepted. Interestingly, another hypothesis that changed our understanding of cancer biology was also published that year: Knudson's two-hit hypothesis of tumor suppressor genes[9]. Judah Folkman often said Science goes where you imagine it. A lot of today's research is not at all about proving an important hypothesis, and some people even mistakenly propose that concepts are no longer needed[10].

Angiogenesis research is full of failures

The story of angiogenesis research is a very complicated one. Not only took it Judah Folkman a long time and a lot of subbornness before his views became accepted, but there were many failures and setbacks along the way. Some scientific breakthroughs were an instant success, e.g. RNA interference awarded a Nobel Prize in 2006[11], but most research is just very complicated, including medical research. A September Science article about medical interventions found a median interval of 24 years between first description and earliest highly cited article[12].

Angiogenesis research has had an impact

The number of Pubmed citations is one good indicator for the research activity in a given field. Pubmed today lists 37,482 publications about angiogenesis, including 19985 publications from the last five years. This compares favorably to research about telomerase (8040 publications), and microRNA (3541 publications), two areas of research mentioned in the discussions about potential 2008 winners. Impact can be also measured in other ways, but it is clear that the concept of angiogenesis has not only profoundly changed cancer research, but is also important in many other diseases, summarized in a 2005 Nature article[13].

Angiogenesis research is medical research

As the name already suggests, the Nobel Prize for Physiology or Medicine is actually two prizes in one. It is a Nobel Prize in Biology, awarded for major achievements in our understanding of all aspects of biology. But is also a Nobel Prize in Medicine, where major advances in our understanding of human disease are awarded. The 2005 Nobel Prize to Barry Marshall and Robin Warren for the role of Helicobacter pylori in gastric disease[14] is a good recent example of the latter category.
The research by Folkman and others has changed the way we think about cancer, but also the way we treat cancer. Each year, more than one million patients with colon, lung or breast cancer are treated with the anti-VEGF antibody bevacizumab. Other drugs targeting angiogenesis are either already in clinical use (e.g. sunitinib for renal cancer) or in development. This makes angiogenesis research a prime example for translational research. I very much agree with the views expressed in a set of articles in Nature this June[15], that more has to be done to connect our much better understanding of fundamental biological processes to the way we diagnose, prevent and treat diseases. And a Nobel Prize would be a strong signal.

fn1. Announcement of the Nobel Prize in Physiology or Medicine

fn2. Nobel Redux

fn3. Nobels 2008

fn4. 2008 Nobel Predictions

fn5. Collective Blogging – Nobel Prize announcements

fn6. Nature 2008 doi:10.1038/451781a

fn7. PNAS 2008 doi:10.1073/pnas.0806582105

fn8. N Engl J Med 1971 Tumor angiogenesis: therapeutic implications

fn9. PNAS 1971 Mutation and Cancer: Statistical Study of Retinoblastoma

fn10. The End of Theory: The Data Deluge Makes the Scientific Method Obsolete

fn11. Nobel Prize in Physiology or Medicine 2006

fn12. Science 2008 doi:10.1126/science.1160622

fn13. Nature 2005 doi:10.1038/nature04478

fn14. Nobel Prize in Physiology or Medicine 2005

fn15. Nature 2008 doi:10.1038/453839a