

## The future is now for systems medicine

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The Spokesman-Review

December 12, 2006

When Dr. Leroy Hood could not sell his contemporaries at Caltech on the notion that expanding the frontiers of biological studies would take more than biologists, he took his idea to the University of Washington. The rest, as they say, is the future.

Hood eventually co-founded the Institute for Systems Biology in Seattle. There the mixed bag of scientists he envisioned pursues audacious ideas like putting rudimentary — for now — biological systems on a computer chip. The institute has a new 65,000-square-foot building, a staff of 180, and a yearly budget of \$25 million.

In addition to its own research efforts, the institute funds several private companies. One recently went public for \$55 million. And Hood and other institute scientists are also helping reshape science education in a few West Side school systems.

Classroom breakthroughs would be as important for Washington as those in the lab.

But for Spokane, Hood's most important initiative is a proposed Institute for Systems Medicine, which would put basic science to work in Inland Northwest hospitals and clinics.

Hood put the idea for a Spokane institute in play two years ago. Since then, a group of area individuals, corporations and legislators has put together an ambitious business plan and prospectus. Make that very ambitious.

They envision an enterprise on the scale of the ISB in Seattle, but one much more integrated into our existing medical infrastructure, which already accounts for 20 percent of all economic activity in Spokane.

The Spokane institute would focus on epigenomics, which might very crudely be described as a combination of epidemiology, the study of disease in populations, and genomics, the study of genes and how they work. The institute would focus less on proteins, the building blocks of genetics, and more on the environmental and geographic factors that may determine whether they cause human cells to go awry, triggering cancer or other diseases.

What is it about this area, for example, that might explain a higher-than-normal rate of multiple sclerosis?

ISM needs two things to succeed; money and a star like Hood, who raised the money for the Institute for Systems Biology based on his own prodigious reputation and extensive connections. About 90 percent comes from government entities like the National Institutes of Health.

Hood himself says government is not likely to be much of a business partner in the future. He suggests Spokane will have to rely more on contributions from the private sector, foundations, and partners like the region's universities and Pacific Northwest National Laboratories.

ISM startup costs have been covered so far by the state, Spokane County, and private contributions. U.S. Department of Defense money is upcoming. It will take a lot more to bring the institute into being one year from now.

Chief Executive Officer Lewis Rumpler says the institute will seek about \$60 million in state aid over its first five years. Government money would constitute about 60 percent of funding early on, he says.

A committee led by developer John Stone, an institute supporter from day one, is putting together a campaign to raise the rest from non-government sources.

With funding assured, the institute would have the wherewithal to attract the chief scientific officer and associates essential to success.

Among the fantastic innovations Hood foresees are periodic blood tests that might predict disease before any symptoms arise. That capability would be the launching point for what he calls the P4 model; predictive, preventative, personalized and participatory medicine.

If that sounds too futuristic, Hood recalls the skepticism that greeted early efforts to map the human genome. With the help of increasingly powerful computers, the task was completed in a few years instead of a few decades.

Systems biology, and the systems medicine that will bring it to the patient, will transform health care within the next two decades, Hood says.

That's a lot less hard to accept than one final Hood prediction — that all this progress will reduce the cost of medical care. Only better health habits will lower the cost of care, and even Hood concedes there is little that has been done, or perhaps can be done, to change the self-destructive behaviors that account for so much of what we spend on treatment.

That "participatory" element can be a fifth P; problematic.

But participatory for Spokane means the opportunity to be on the forefront of a new kind of medicine. If a sixth P, price, seems prohibitive, Hood has a final observation; "What seems like an incredible investment in the beginning will be a bargain in the end."