

Keynote Luncheon: “The Prepared Mind”

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The concept of a virus being related to malignancies was a tough sell for discoverers such as Rous and Bittner. There was no known mechanism; it did not seem to make sense that a virus would cause cancer, especially because different people had cancers but they were not getting them in families and they were not getting them in communities the way other viruses seemed to spread.

Various scientists such as Galileo and Temin, as well as Judah Folkman, the father of angiogenesis, were derided for their acceptance of seemingly extreme concepts in science. Their minds had been prepared and they were willing to see something in a new light. They noticed something, but noticing was not enough. Louis Pasteur once said, “In the field of observation, chance favors only the prepared mind.” The question was, did the community at least have to be equally prepared?

The discoveries of the relationship between smoking and tobacco and cancer were repeatedly resisted by the community. Some big discoveries may have been resisted for various reasons: the push to further the discovery was only tentative (scurvy); the associated expense would be too large; the new hypothesis ran counter to prevailing wisdom or there is an uncertain mechanism (viral oncogenesis); hypotheses were merely heresy which went against a known law of science (reverse transcription, Copernicanism); it was an idea that was simply too radically different from the commonly-held view (angiogenesis); or the message itself was simply uncomfortable (dangers of smoking).

The idea of cancer prevention has been around since the beginning of understanding cancer itself. If the burden of cancer is to be reduced, we have got to think about prevention and preemption, but the thought of preemption has been resisted throughout time. Prevention does require investment; it is counter to the prevailing wisdom in the way we treat most diseases, which is waiting until one gets sick and taking a magic pill to heal it; there is an uncertain mechanism; some drugs and treatments have significant side effects and some show only tentative abilities to work; prevention is outside the commonly-held view of treatment, such as using tamoxifen to treat breast cancer, a drug which focused on estrogen receptor rather than estrogen; and prevention is an uncomfortable message since no one wants to think they are actually at risk for cancer.

The community itself must take the lead in some of these new scientific beliefs. When a discovery comes along and a community embraces it and runs with it, it is then put into practice and even newer discoveries can flow from that.

In response to an audience question, chemoprevention has been at the forefront of breast cancer treatment. The idea of trying to prove a negative, or disprove a negative, the idea of saying a medication which you can take will stop you from having a disease you would have had, is a very difficult concept to get around. People are uncomfortable with the notion that they may be at risk.

An alternative way to talk is to focus on a more realistic assessment of what the cancer burden is and what the problem is; if people are not told what the problem is and how that problem is growing by leaps and bounds, then they are not concerned. The first thing you have to do is scare people. This requires looking at the aging of America and age adjusted death rates, and noting how over time, by 2030, we will likely double the burden that we now have in cancer.

Also, we must be more open about the idea that people are not only at risk but actually, in some ways, are going through the process of carcinogenesis as we speak. We know that cancer is a series of accidents, and these accidents are occurring all the time in body, yet most of the time, they are being caught and controlled. People must be scared by candidly hearing what the burden of cancer is, and people must be told that they themselves are at risk for cancer.

Examples of prevention which has been accepted include the use of fluoride in toothpaste and vaccines in children. Conversations on cancer must change to similarly align with the notion of prevention. Information is a great weapon; the way to change things is by calling attention to them.

The priority is investing in the science of preemption, which is looking at the early pre-cancer stage, not in situ cancers but the first dysregulations of the cell, and looking to see whether we can co-op that by treating the microenvironment, by treating around the cell, not trying to change the mutations but trying to change the signaling in the microenvironment. For example, with angiogenesis, if the recruitment of angiogenesis can be stopped before it becomes a tumor, you may be able to shut that process down. If cell differentiation can be controlled in a better way, that also can be of benefit. We now approach this problem too late; we wait until we already have tumors and mutation that we cannot possibly fix, and then we try to stop the problem. We should intervene early in low toxicities to change the paradigm.