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I would like to thank the organizers of this unique conference and particularly Mr. Omi for inviting me back to Kyoto.

My name is Alan Russell and I lead the McGowan Institute for Regenerative Medicine at the University of Pittsburgh and its affiliated health system UPMC. Regenerative medicine is a rapidly growing field in which universities and companies are partnering in order to develop new therapies that can cure debilitating diseases rather than treat symptoms. We use cells, stem cells and materials to rebuild damaged tissues.

As someone who was trained as a chemist and then headed a chemical engineering department before becoming a Professor of Surgery and leading an Institute for Regenerative Medicine, I have enjoyed a career doing things that I am not qualified to do. In talking to you today about partnerships between industry and academia I will be relying on those finely tuned skills. In the spirit of our theme over the last few days we will discuss both the lights and the shadows of university-industry partnerships with a particular focus on such relationships in the context of academic medical centers.

Knowledge generators in academia are driven to partner with wealth creators in industry because of the clear need of patients and because of our shared desire to reduce human suffering. Patients expect that when public funds are being used to pay for research in the health sciences that successful results will improve their lives. Unfortunately, patients understand very little about the scientific process and even less about how an idea in a laboratory might make its way into a new marketed therapy. This inevitably means that political forces drive collaborations without a realization that these partnerships can cause changes that may shake the foundation of academe and introduce temptations that compromise the sanctity of the scientific process. We will come to these shadows of technology transfer later.

In the quest for cures there are many commonalities between the academic and corporate sectors that drive and lubricate cross-border collaborations. I think most important is that we use the same feedstock: very smart young people. Academia produces the feedstock of graduate students and postdoctoral fellows that meet its own needs and those needs of corporate research systems. Universities and companies are inexorably coupled, and always have been, by these researchers who flow from one to the other.

Another commonality is the shared yearning of people in research to communicate with each other. In times of war between countries, scientists still communicate. The chemistry of a scientist is to find other people with the same passion and use each other to spur creativity and innovation. This happens in industry as much as it does in academia. Because academics are

often exquisitely trained to answer questions, whereas their colleagues in industry often are more motivated by identifying important questions to answer, there is a natural synergy that results from bringing the two together.

In the quest for cures there is also a shared recognition that knowledge generation and wealth generation are both very expensive endeavors. A new therapy can cost a billion dollars to bring to market, and universities are investing billions in infrastructure that can answer the questions that seem to become more complex all the time. In order to make new cures that generate extraordinary health and wealth we all know that large fractions of that wealth must be re-invested to keep the cycle going. This is especially true in new complex areas where our combined goals are as significant as growing entire organs outside the body.

So, people, chemistry and money are powerful driving forces that make collaboration a necessity. It should come as no surprise therefore that for decades the companies that produce cures have been sponsoring research at universities. Indeed, I always find it somewhat amusing that people tend to ask “should universities and companies collaborate?” We are already married to industry and one of the most frequent reasons for a separation is that the two sides tend to behave as if they are negotiating a pre-nuptial agreement instead of focusing on how to make the marriage work.

Taking the analogy further, if we assume that academe and industry are already married in the quest for cures we should not be surprised to see examples of happy marriages, bad marriages, abusive marriages and divorces. Our challenge is how to make sure our children gain the benefit of a good marriage.

In the marriage, do we have conflicting goals? I think not. I think that scientists in academia do predominantly want to answer questions and those in industry do predominantly want to make products, but because the people that pay the bills only care about two things (health and wealth) we must each position our work in a similar light.

If there are so many good reasons for why industry and academe have married each other for purpose of generating health and wealth, what are some of the challenges that can destabilize the relationship?

If we each had a yen for every time we heard someone moan about woes in intellectual property agreements or issues with conflict of interest we would all be far too wealthy to care about those problems. Of course IP and conflicts of interest are serious issues. They are with company to company interactions. Of course the policies of governments wreak havoc on the marriage, even when they are trying to help. In the health domain we have the added burdens of regulatory and reimbursement issues. We have the reality that the marriage is rather incestuous. Not only do academic medical centers invent therapeutic strategies during the marriage but they are then the recipient of funds to test them and later they receive funds from patients who are being treated.

Conflict of interest, ownership of IP, access to IP and government policy create huge problems but they are all manageable if the people involved trust and like each other. The best clustering of technical projects across institutional lines is doomed to fail if there is a lack of trust and collegiality. Deals may be struck, but if the partners do not feel good about the partnership it will usually be the last deal. I would happy to answer questions about how to

manage these potential deal killers later but for now I want to shift gears a little and talk about the need to shift from industry-academic sponsorship to industry-academic partnership.

In the past, so called partnerships were really "sponsorship" relationships, in which companies provided university researchers with resources and financing. In this model, many companies valued university research principally for solving specific problems or for generating knowledge over the long-term.

Today's knowledge-based economy should, I believe, motivate a shift in from "sponsorship" to "partnership". Under this model of the marriage there are open and regular communications and the partners do much more than write checks and exchange reports. Although many industrial firms still think of universities as simply a source of basic knowledge and highly trained students and graduates, and while the partnering process is not always managed properly, universities can be valued partners providing complementary expertise, knowledge and resources that are often unavailable even within the health science corporate system.

At UPMC, the US's largest academic health system with annual revenue of \$6 billion, we are making the transition from a sponsorship mentality to a partnership mentality. We have created a Strategic Business Initiatives Division to coordinate the identification and nurturing of such partners. Because of unusually successful financial model we also enter these partnerships as an investor. For example, last year we executed a \$400 million partnership with IBM focused on a complete integration of the IT systems for our health center. Within that deal UPMC and IBM each put aside \$25 million for a jointly run innovation fund. Interestingly, partnership is harder than sponsorship so we are still finding our way. Partnership requires the parties to agree on a joint vision and then work together to allocate resources to jointly achieving and then exploiting the vision. Sponsorship generally involves the company setting the vision and paying the university to achieve it. Partnership is much more difficult, but we believe it will also be much more rewarding.

The McGowan Institute for Regenerative Medicine was named after Bill McGowan who had a heart transplant in Pittsburgh over a decade ago. Bill was the founder of MCI and a remarkable man who decided that a start up business could take on a telephone monopoly, AT&T, and win. He was bold and courageous in business and in health. Bill exhibited a set of characteristics that I think should characterize any approach to establishing a university-company relationship. He would have recommended that the partnerships be established on the basis of a shared vision, that they embrace risk and drive change in an industry, that the team is tenacious in its pursuit of its goal and most of all that if a rule prevents progress, the rule should be changed. Bill McGowan used technology to revolutionize the telecommunications industry. Later in life he invested in disruptive technologies that will reshape the way we deliver healthcare. He would insist that we find a way to make the academic-industry relationship work to create health and wealth. Together we have a responsibility to meet that challenge.

Thank you