Speech of
DR. GREGORY PAUL WINTER
Co-winner of the 1995 King Faisal International Prize

for Medicine (Molecular Immunology)

Your Royal Highness Prince Sultant ibn Abd Al-Aziz
Your Royal Highnesses
Your Excellencies
Distinguished Guests

It is a great honour for me to receive The King Faisal International Prize from the "custodians" of a civilization that in former times taught sciences to the West. Islam has embraced many peoples, seeking out knowledge from the far corners of the world, writing it down, and developing science by theory and experiment. In the Dark Ages of Europe it was the Muslim world that kept alive the flame of science.

The science of alchemy was brought into Europe in the Middle Ages by the writings of Al-Razi and provided a key strand in the development of medical chemistry in Europe. The writings of Ibn Sina provided Europe's principal text on medicine for centuries; for example Ibn Sina is mentioned in the "Canterbury Tales" by Geoffrey Chaucer, one of the most important manuscripts of English literature, and dating from the 14th century. This was an age in which the cross-fertilization of Europe and the Muslim world was at its most intense. In our own age, The King Faisal Foundation stands for such traditions of thought and scholarship that transcend the barriers of language and culture.

My own work has involved the development of a technology for making artificial human antibodies in tile test tube. Antibodies are a key part of our natural defense against disease. Natural antibodies recognize "foreign invaders" such as viruses, bacteria, and parasites and destroy them. Each antibody has a different shape and fits the invader like a key fits a lock so that, for example, antibodies against one disease do not work against others.

It is important that antibodies recognize only foreign invaders and do not attack our own tissues; for example antibodies against nerve cells can lead to nerve damage and paralysis. Fortunately the body has special mechanisms that generally eliminate such antibodies at an early stage. However, for some purposes, it would be desirable to make antibodies against our own cells, for example, to destroy cancer cells. As it is impossible to make such antibodies in the body, we decided that we would have to make them outside the body, in the test tube.

How could we do this? The technology is difficult, but the idea is simple, and can he explained by an analogy. Suppose you needed to open a locked door but did not have the key. You could make a few different keys at random and try them, but it is unlikely that you would be successful. However the more keys you made, the greater the chances that you would find one that fits and unlocks the door. If you made a huge number of keys, not only you would be able to open that door but virtually any other door. In fact this is the strategy of a master thief.

So now imagine that the antibody is the key and the cancer cell is the lock. We have developed techniques for making huge numbers of different antibodies and also techniques for finding the ones that “fit”. We create a population of antibody genes, and haste the genes into a virus, so that each virus particle displays a different antibody “key” on its surface. The population of virus particles is then added to cancer cells; the correct antibody “key” sticks the virus to the cells. In this way we have been able to select artificial antibodies against many different things, against human cells and against foreign invaders. The technique does not require animal or human immunization and we believe that such antibodies will not only be useful in cancer therapy, but in infectious diseases.

I am most grateful to the generosity of The King Faisal Foundation in awarding this Prize. Not only is it opening my eyes to another world of scholars and disciplines with the potential for cross-fertilization, but I am hopeful that the public recognition may further promote the application of antibodies in medicine for the common good.