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Ferid Murad
Heart of science

Biochemist at the George Washington University in Washington, DC, he shared the 1998 Nobel Prize in Physiology or Medicine for the discovery that nitric oxide acts as a signalling molecule in the cardiovascular system, prompting blood vessels to relax. Murad was born in Whiting, Indiana in 1936. His American mother was only 17 years old when she eloped with his father, an Albanian immigrant. His parents ran a restaurant, where he and his two brothers worked. Murad used to memorize customers' orders and mentally tally their bills, which he believed trained his memory and maths skills.

How important is it for young doctors and medical researchers to think about the bigger questions: the essence of truth or the existence of God?
Scientists by nature have to be curious to answer questions of nature — to discover how things work. The beauty of science is that once you've answered a question, that leads to further questions, sometimes more important ones. Doctors are taught scientific enquiry in medical school, but it's not required that they be scientists. Yet if they are taught this well, it should improve their skills.

Science is about seeking the truth. The existence of god is irrelevant to a scientist, as is his or her faith. It is possible to have faith and be a scientist at same time; it is also possible to be an atheist and a scientist at the same time.

There are some researchers, however, whose faith and religion tend to distort the facts. That's not going to lead to high-quality science. For example, some people's religion makes them reluctant to perform embryonic stem cell research. Many think it's unethical — and some politicians have made it illegal, but that's foolish. These are tissue samples that will otherwise be incinerated. They present an opportunity to do good biology and get information that is not otherwise available.

Science is all about getting to the facts — to information: how creatures are 'created' and evolve, including on other planets too where there could be life. Extra-terrestrial life will be interesting to prove one way or another. There are so many thousands of planets in this galaxy that ours can't be the only one to develop life.

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Nature Video of Murad advising a young researcher:
go.nature.com/a5eijf

Incidence of diabetes is increasing worldwide. How do we minimize this problem?
When I was a trainee in the United States in the 1950–60s, the incidence of diabetes was about 2%, today it's 7–8% — and in some subsets or minorities it is higher. The Pima indians in southern Arizona have an incidence of about 70%. It's incredible. They have been researched by the National Institutes of Health to help understand some of the reasons underlying diabetes. We have learned over the years that there are multiple causes: genetics, infections that injure the pancreas and its ability to produce insulin, diet, exercise and obesity. It's a complicated and growing problem.

Most problems with diabetes are cardiovascular. As the disease modifies proteins in blood vessels it leads to atherosclerosis, and, in turn, compromises blood flow to the heart, limbs and other tissues.

Do you think efforts to control diabetes could learn from the example of cardiovascular disease, which is better managed now?
It isn't fair to imply that cardiovascular disease is going away. Frequency of mortality with cardiovascular disease has improved: we are better at treating acute heart attacks and arrhythmias; we have better-trained paramedics and better-equipped emergency rooms. But people who have had heart attacks now live with injured heart muscle, which predisposes them to congestive heart failure. Plus they will have endothelial dysfunction of the blood vessels because they don't make enough nitric oxide. So there will be serious cardiovascular problems in the future.

We are better at controlling and treating hypertension, which is a big factor in cardiovascular disease. Incidence and frequency of cardiovascular disease is diminishing a little and cancer will soon overtake cardiovascular disease in frequency of mortality, but they are both still serious problems.

Life expectancy will continue to increase, although maybe not as rapidly as in the past 100 years following introduction of vaccines and antibiotics. However, life expectancy in the US is lower than in many other Western countries because of our style of fast living, fast foods, stress, etc.

Should medical science draw on insights from psychology, behavioural and social science to try to change detrimental human behaviours?
They can all influence behaviour, but they won't cure diabetes. That requires sophisticated medical research. The inheritance of diabetes is

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Murad takes some time to pass on his experience to young researchers at the 2011 Lindau meeting.

probably not just a single gene but a concert of them. When there are multiple genes participating, it's often very difficult to sort out.

We were hoping that the human genome project would provide a lot of answers. Yet, it hasn't provided them all because there are multiple genes and factors that participate in these diseases.

Do you think antibiotic resistance is a big threat?
We're giving antibiotics to livestock. That is nonsense: it is creating resistant organisms, because the antibiotics are not being used to treat disease and the livestock owners are not dosing properly. Furthermore, we don't use these drugs in combination to eliminate organisms. We're always searching for better ones because we're not using them properly.

Viruses and bacteria are pretty clever — some more than others. Look at the effort and expense to develop treatment for HIV. We're using multiple drugs to treat patients, but they still have latent virus hibernating somewhere. We're afraid that if we stop treatment the virus will come back. We can slow it down and make people live longer, but we haven't cured it yet.

Do you always think and behave scientifically?
I'm a workaholic. I love science. I think about it almost all the time. Even when I try to relax: watching TV or doing something else, I can only do that for 5 to15 minutes, then I get distracted thinking about experiments. It has been disruptive to family life. I have five children and I probably haven't spent enough time with them over the years. When they were younger, I would always take 2 to 3 weeks in the summer to go camping with them, and I tried to be home every day for dinner. But even if I made it, I often went to my study or back to the lab afterwards.

What did you learn from your mentor, and what do you think your students would say they have learnt from you?
I was fortunate because I had a long period of training and had many mentors who were excellent. They tended to give me a lot of freedom; they were there to help me and answer problems and review ideas. I try to recognize the strengths of each of them and come up with some hybrid that I can be as a mentor, to use the best features of each.

My first mentor in graduate school, Earl Sutherland Jr — who received a Nobel prize in 1971, taught me a lot about creativity. Research is not doing what's been done before — that's confirmation. Research is doing something that's never been done before — that's creativity.

Conversely, what didn't you learn from your mentors?
They all had a lot of scientific and personal strengths, however none of them knew anything about the drug development industry, business or finance. I had to learn a lot of that on my own. Some of the business folks I've met along the way have taught me a lot about businesses and what it takes to get something done. That's very different from working in a lab.

Is there a difference in the types of science that public versus private organisations can or should do?
I've run one company and helped friends and colleagues create about seven others. Academics do science because they love it. Of course, you have to be successful and get grants, be published, be recognized and get promoted. But basically you really enjoy it. In industry you also enjoy it, but you don't necessarily have to publish; companies value patents. And the rewards are to the team not the individual. Industrial science is much more of a team effort.

Academia and industry can learn from each other. Many projects and problems require collaboration between the two. I don't think an academic can find the funds to take a compound into clinical trials. But industry doesn't necessarily have the skills to find the target to start the process of drug discovery. We need more collaboration. The problem is that people are sceptical and tend not to trust each other.

Is there a downside to winning the Nobel prize?
Yes. My wife would agree. It results in a lot of travel. Everybody expects you to know everything about everything. They don't realize that you really have a discrete specialization in one area; they think you can do anything — like advise presidents to solve problems in education. Also, you're on the internet, so everybody knows about you and you lose your private life. That disturbs me a bit. Everywhere you go there will always be someone who recognizes you as a Nobel laureate, and that can be hard to cope with. ■

This is an awesome answer, because a lot of scientists will only say that science is a passion and it should not matter if you spend every Saturday night in the laboratory. I don't think that's healthy for the mind. I completely appreciate his wish to spend more time with family and to face less intrusion.. Life should be about equilibrium between love, work, family, religion and your hobbies; they all make you happy.

William Omar Contreras Lopez, a Columbian neurosurgeon and PhD student in molecular neurosurgery in Freiburg, Germany, who posed the original question on lindau.nature.com