Genetic Progress and Precautions – Francis Collins
(Second in SERIES of 3)

VOICE: If you think your genes are perfect, Dr. Collins has bad news. We are all walking around with dozens of genetic errors in our bodies, which place us at risk for some disease.

PROF.: But he also has ***good*** news. He and other researchers are making progress on ways to overcome these problems. And they are developing ways to prevent our new genetic knowledge from being used in harmful ways.

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VOICE: Professor, since we featured geneticist Dr. Francis Collins in our previous episode, I've been reading about him on the Internet. I learned that before he became director of the Human Genome Project, he discovered the genetic cause of several diseases. Some of them are being cured by replacing a gene that wasn't working.

PROF.: Yes. And he and others are researching the possibility of ***turning off*** a gene that's ***doing harm***. Some genes cause the body to make a protein which harms the body's cells. To block that, a new idea has emerged in the last few years called "RNA interference."

RNA interference enables researchers to turn off a very specific gene. There are trials now going on in animals, which look moderately promising. The big problem is going to be delivery – how to get a big complicated molecule like DNA or RNA into the tissue where it can do some good.

VOICE: That does sound difficult.

PROF.: So Dr. Collins thinks we probably will be able to treat many diseases by improved kinds of medication before gene therapy is useful in humans. We understand many biological defects well enough to design a drug that goes right to the problem instead of treating some secondary effect.

VOICE: What's an example of improved drug therapy?

PROF.: A drug called Gleevec [GLEE-vek] has been developed to treat a previously incurable form of adult leukemia...

VOICE: …Cancer of the blood.

PROF.: Yes. Leukemia develops because of a specific mutation in a white blood cell. This mutation creates a protein that causes a normal white cell to go out of control and results in leukemia. In most cases, this form of leukemia is fatal.

VOICE: How are doctors curing this previously incurable disease?

PROF.: Researchers recognized that the protein that causes this type of leukemia isn't present in normal cells. So they reasoned that if we could block its action, we could have some benefit against the disease and maybe not have many side effects. And so researcher Brian Drucker [BRY-an DRUK-er] developed a drug that moves into the active site of that protein and blocks its action. It became one of the more dramatic therapeutic advances of the last ten years.

VOICE: Very few drugs are effective in 100 per cent of cases of a disease. What is the success rate on this one?

PROF.: Reserchers gave this drug to 32 people who had advanced chronic leukemia. These people had a life expectancy of only a few months and volunteered to take this experimental medication. Researchers didn't expect to learn anything except whether this drug had harmful side effects.

They were surprised to see that 31 of those 32 advanced leukemia patients went into a complete sustained remission. Most of them are alive today without evidence of the disease. That's the kind of outcome that we wish to see for many additional diseases, using this strategy of developing a medicine that will block something very specific that needs to be blocked.

VOICE: 31 out of the first 32. That's outstanding!

PROF.: Dr. Collins' laboratory has researched the disease progeria [pro-JEER-ee-uh], a dramatic form of premature aging. This disease causes the body to age at six to eight times its normal speed, making many children die by age 13 of heart attack or stroke.

Progeria's cause had been a complete mystery until 2003, when the Human Genome Project enabled us to find the gene that's involved. Collins and his researchers discovered that a drug that had been developed for cancer, might be exactly the right drug for progeria.

Dr. Collins says, "You couldn't imagine those things happening a few years ago. But with all of these connections and information, these kinds of dreams are possible to come true, although many of them are going to take a lot longer than we wish. I hope you feel as excited as I do about the potential."

VOICE: At the beginning of the program, you said people are developing ways to prevent our new genetic knowledge from being used in harmful ways. Tell me about that.

PROF.: Dr. Collins said Jesus Christ was sending us a strong message, by devoting so much of his time to healing. During his life on earth, Jesus went through all the villages teaching, preaching the good news of the kingdom and healing every disease and sickness. That is one of our strongest mandates to try to heal.

But we also have to recognize our moral responsibility. We need to work to make sure these advances are not misused. Collins worries that scientists sometimes get afflicted with pride or arrogance and think we understand the Book of Life. And we forget who the real Author is.

VOICE: We forget that God is the creator of life, including the genes that tell the various organs of the body how to assemble and how to function.

PROF.: He says followers of Christ should have two goals: First, to support the possibility of healing, and second, to practice moral responsibility to be sure that abuses don't occur. To achieve these goals, Christians have to be well-informed. Often there's misunderstanding – scientists not really understanding what the religious perspective is all about, and religious people not understanding the scientific perspective.

It's not good to have zeal without knowledge. Among scientists and among people of faith, there's a lot of zeal and less knowledge than there needs to be.

VOICE: Which issues does he think are problems?

PROF.: The technology already exists to identify some risks of future illness. Dr. Collins described a situation in which some members of a family already have colon cancer, and genetic tests indicate that others are likely to develop it.

In some countries, employers usually provide health insurance for their employees. If an employee gets an illness, an insurance company will pay the hospital bills. But if an employer knows that a certain employee has a genetic weakness that makes him likely to develop a major disease, he may refuse to hire him, because his insurance will be very costly.

VOICE: In other words, in some countries a person who is at high risk to become ill, might be kept from getting either a job or medical care.

PROF.: Yes. Dr. Collins says, "If you thought…that you're the one perfect genetic specimen on the planet, I have some very bad news." We are all walking around with dozens of errors in our genomes that place us at risk for something. They are going to be discovered, and that can be very ***helpful*** to you. But this information can also be used in ways that ***harm*** you.

VOICE: So a scientist who is doing genetic research must have more than just technical scientific knowledge.

PROF.: Yes. Someone remarked that humans have a tendency to acquire "brilliance without conscience." He added, "Ours is a world of nuclear giants and ethical infants."

So Dr. Collins is attempting to convince the United States Congress to make laws that prevent genetic information from being used in deciding whether or not a person can be hired, fired or promoted in a job.

VOICE: What other dangers does Dr. Collins see can result from our new knowledge of our genetic structure?

PROF.: He answers, "Our society, in its love affair with DNA, [is] moving in the direction of thinking of the human body as a machine." They're thinking of people as puppets – "being controlled by these invisible double-helical strands that we inherited from our parents and that cause us to march to that tune."

He interprets, "Free will is at risk and people begin to assume that the environment doesn't matter so much because it's all about genes. That idea is used for an argument that we don't need God anymore, that's it's all understandable in its reductionist mode."

VOICE: In other words, some scientists oversimplify the situation by reducing our understanding of humans, thinking we are just atoms, molecules and genes.

PROF.: Yes. After studying the genome for more than a decade, Dr. Collins sees the limitations of what he has learned in the laboratory. In his words, "Genes are going to tell us a lot of interesting stuff. They're not going to tell us what [unselfish] love is all about. They're not going to tell us why all human beings in all cultures have a sense of right and wrong – the moral law, this searching for something greater than themselves. Science is not suited to answer those questions."

VOICE: On our next program, Dr. Collins will tell us how he found answers to the most important questions in life.

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