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research tool to identify the remainder of the coding region of the gene. The utility would not be known until additional research was completed, and it would probably rest with the full cDNA, the genomic clones containing the gene, or the protein product of the gene, not with the EST itself. The EST is, at best, a starting point for further research and should not be patentable.

The ASHG is concerned that patenting of ESTs may be detrimental to the interests of the Human Genome Project and to society. The project should be an international collaboration. The international Human Genome Organization (HUGO) has stated this principle since its inception in 1988. It should not be a competition between laboratories and between countries to see who can "own" the largest portion of the human genome to exploit. Under such conditions the information would not be shared between the competing groups until after patents were secured, and duplication of effort would be impossible to avoid.

Because an EST is part of a gene, different ESTs from the same gene may be isolated by different laboratories. Furthermore, a gene is often part of a gene family, so that one EST may recognize more than one gene. We anticipate major problems when several research groups end up with competing patent claims for the same gene or genes.

Normally, a patent ensures that a gene will be available for all researchers and for any company willing to license it. We fear that in the case of ESTs it may have quite the opposite effect. The academic community is unlikely to put major research effort into an EST-identified gene or its protein product if someone else already has the right to license its use. In the commerical sector there may be reluctance to invest in research on EST-identified genes when a small but unknown fraction of them will turn out to have commercial utility, and when the useful ones may be contested by patents on other ESTs from the same gene.

The ASHG urges the U.S. Patent and Trademark Office to give high priority to the resolution of the EST patent issue. One argument for patenting ESTs has been that if they were published without patenting this might compromise the patentability of a future diagnostic or therapeutic procedure based on a gene or gene product derived from an EST in the public domain. What is needed without delay is a statement from the Patent Office about this potential problem. If it is not a problem, then it takes away the main argument for patenting ESTs. If it is a problem, then perhaps the best course is to rethink current patent law and to amend it to ensure that genome research is not thwarted by laws developed in simpler times to deal with simpler issues.

An international collaborative venture as bold as the Human Genome Project should not be jeopardized by the possibility of irrevocable damage inflicted by EST patents, the majority of which may never have any commercial utility. Let us strive to ensure that patents are obtainable at a stage in the process that will still allow commercial exploitation of genetic information, but not so early in the process that it will stifle individual scientific endeavor and lead to international chaos.

Human Genome Committee and
Board of Directors,
American Society of Human Genetics,
Bethesda, MD 20814

Respect for Vitamin C

In the second of two News articles about the Linus Pauling Institute of Science and Medicine (Briefings, 11 Oct., p. 192; Research News, 18 Oct., p. 374), my claims about ascorbate (vitamin C) are described as "hype." I contend that my statements about vitamin C are not hype except in the minds of critics who believe that vitamin C has no function except to prevent scurvy and that larger intakes have no value. I continue to accept the evidence that the optimum intake of this vitamin for an adult human being is between 2 and 18 grams per day (more in times of illness). Part of this evidence is that almost all animal species manufacture vitamin C in liver or kidney cells, and that the daily amounts manufactured, converted to the body weight of a human adult, lie in the range of 2 to 18 grams, and more in periods of stress.

The result of ingesting such a minute amount of this vitamin as 60 milligrams per day, the U.S. recommended dietary allowance, is that human beings are in poor health, age rapidly, and experience a high incidence of and mortality from many diseases. Vitamin C is not a drug. It is a nutrient which, taken in the optimum amounts, offers an opportunity for great improvement in human health.

LINUS PAULING
Linus Pauling Institute
of Science and Medicine,
Palo Alto, CA 94306

The 18 October Research News article about vitamin C was an excellent presentation of some of the recent issues in vitamin C research. Your readers may be interested to know that the complete proceedings of the 1990 National Cancer Institute Symposium, which was mentioned in the article, will be published in the December issue of the *American Journal of Clinical Nutrition.*

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