Debate among policy makers and experts about genetically modified organisms has tended to frame the issue in terms of risks and benefits; this circumscribes the role of values in the debate and transforms the issue into a largely scientific one that should be restricted to experts. Scientists tell us what the benefits and risks are and whether the new technology is worthwhile. Critics often respond by noting that values can play at least some role even within this framework. The questions of how much risk is too much, what sorts of benefits are worthwhile and to what extent are they valued, and, above all, how much uncertainty is acceptable, are all issues that allow values to be introduced. Even so, the role of values is fairly limited in this way of framing debates.

There is little doubt that the creation of genetically modified organisms can offer many advantages. Current genetically modified organisms have included crops that are largely of benefit to farmers and are not clearly of broad public value. That situation will soon change as future genetically modified organisms will include: foods that have far greater nutritional benefit, crops that can grow in regions with poor soil that currently cannot support subsistence agriculture, cattle whose milk offers pharmaceutical benefit, foods that are more desirable in terms of traits that the public wants (e.g., Brussels sprouts that taste like chocolate). The market forces that largely determine which of these products are developed are complicated. For example, the traits that may be needed to feed a starving world are different than the traits that farmers in the United States want, and both may differ from the characteristics that the paying public supports.

Most criticisms have focused on two issues. First, there is concern about food safety. What impact will genetically modified organisms have on the health of those who eat them? The new technology makes it possible to cross species barriers with impunity. Will a shellfish gene placed in a tomato cause allergic reactions? The recent scare over StarLink corn is instructive. “Bt corn,” a common genetically modified organism, includes a gene from Bacillus thuringienis, which produces a pesticide that kills the European corn borer. One of the problems with Bt corn is that it is likely that insects will soon develop resistance. StarLink is a new variation of Bt that includes a protein, Cry9C, that does not break down as easily in the body. It may therefore postpone resistance. However, it also has some characteristics of food allergens.

The fact that it will remain in the body longer increases the risk of allergic reactions (though there are no verified cases). StarLink corn was approved for animal feed, but not for human consumption. It is difficult, if not impossible, to keep the food supply for animals and humans separate. The feed is often in the same silos and at least some of the corn from one field can send seed to another.
What are your boundaries? Where do you stop and where does the world begin? If you are a violinist, your bow is already an eloquent, feeling part of you. If you drive race cars, you feel the grip of the tires on the road as if you were running barefoot. If somebody steals your eyeglasses, you are temporarily disabled as surely as if they punch you in the eye. Take away my computers and I might as well have brain damage.

The skin is an important membrane, for most purposes the natural boundary between a person and the rest of the world, but it lost its role as the edge of agency when our ancestors first began to make and use tools. Is there really that much difference between a tool you put inside your body and a tool you enclose in the palm of your hand or wear on the bridge of your nose? Most, if not all, of the conceptual issues — the ethical dilemmas and the other deep revisions in our way of life — have already been confronted time and again, in simpler versions. Implantable brain chips — if they really do become widespread (which I doubt) — will intensify problems and opportunities we are already trying to cope with. Will this intensification move us into altogether new territory? Let’s consider the prospects.

Predictions about the spread of new technology have a dismal track record, so we will probably both overestimate some problems and underestimate others by a wide margin. But we should try. McGee and Maguire (Lahey Clinic Medical Ethics Newsletter, Winter 2001) say “these enhancements will produce major improvements in quality of life or in job performance,” and although they probably didn’t mean “or” to be exclusive, it may well turn out that we will indeed have to choose. Which do we want, improved quality of life or improved job performance?

Why would anybody suppose we can’t have both? Because we have already seen many instances in which improving job performance does diminish quality of life. Consider first a relatively trivial case, and then an ominous one. Thanks to global positioning systems (GPS), it is no longer possible to have the thrill of navigating your little boat across the ocean, relying on sextant and chronometer. You would be foolish to the point of criminal negligence to leave port on such a voyage without availing yourself of the best practical technology, and that technology takes the task of navigation out of your hands, routinizes it to the point where “job performance” is well nigh perfect, but job satisfaction is well nigh invisible. It’s too easy a task to care about, so there is one less adventure-opportunity in the modern world. You can “rough it,” locking your GPS in a box to be opened only in case of emergency, but that’s an exercise in make-believe, like camping out in a theme park. The risks are all packaged.

Much the same future looms for the practice of medicine: as diagnostic technologies get better and better, the satisfactions will correspondingly evaporate. “You” caught your patient’s cancer early enough to treat it successfully, but hey, all you did was order a few obligatory tests, and one came back positive. Anybody could have done it. More to the point, anybody would have been obliged to do it. A miracle of modern medicine has happened, but the “art” has been distributed throughout a huge network of technology, leaving only relatively routine activities for the human participants.

Where there are few opportunities for heroism, for genuine, risky adventure, the quality of life is diminished. But from the patients’ point of view, this is just as it should be: may all my medical care be as routine and risk-free — and, yes, boring — as possible!

This trend towards improved job performance with decreased grounds for satisfaction shows every sign of growing indefinitely with or without implantable brain chips. Imagine a brain chip specialized for anesthesiologists; all the outputs from all the monitoring equipment that now confront the doctor in the operating room are collected in a radio device that transmits them to the chip, for handy distribution to various appropriate cortical areas. Bad idea. Instead, just slap some earphones on the anesthesiologist and code the information about vital signs into an appropriately modulated ensemble of sounds that form a natural system that can be readily understood and internalized, and you’ve accomplished a superb impedance match; your anesthesiologist is optimally ‘wired’ without any wires in the brain. (This is not a fantasy; just such a device has been patented and will soon be in production.)

Implantation is an extreme measure that probably will never be warranted except in very special cases, where people have lost the function of some part of their nervous system. But even here, it is still not clear that implanted interfaces will be more effective than external, wearable interfaces that avail themselves of some underutilized part of the extraordinary bandwidth of the total human sensory surface. But this may change, so let’s consider the range of outcomes that might confront us if implantation becomes a highly desirable course of action.

Whenever a new technology is created, it has the potential to create a new disadvantaged group: those who for whatever reason cannot avail themselves of it. When the highly visual desktop and mouse interface revolutionized human-computer interactions, a large corps of blind programmers lost their livelihoods. They could keep up with sighted programmers as long as everybody was using old-fashioned line editors which moved text around by multiple-keystroke commands, but highlight-and-drag was beyond the capacity of Braille displays to convey to their fingertips. Some activists went so far as to urge outlawing the desktop and mouse, on the grounds that it was a violation of the Americans with Disabilities Act. It is certainly possible (however unlikely) that some equally enhancing brain chip will be developed that can only be implanted in brains that have some currently negligible feature — a deeper-than-average central sulcus, for instance. Then we’ll have created a new ethical problem: what to do about the 50 percent of the population that are ineligible for the new boon.

There is no way to avoid such problems. Any technology worth developing enhances some valued ability, and hence it almost certain to magnify some differences in ability. In some arenas of human
competitive action we particularly prize equalization of ability, and in some we don’t. If some violinist wants to take drugs to enhance her performance, or insists on wearing some hearing-enhancing device to improve her pitch, ensuring herself a position in the orchestra, that’s her business; she may ruin her health in the quest for artistic glory (and the increasing use of beta-blockers by musicians raises some troubling issues), but we currently have no ethic that insists that she give less. If we are to sort out our values, we can’t just jettison them all. We do need stress on privacy, autonomy and justice, and the task of applied ethics is to look for practical ethical responses to such posited problems. It is more than probable that brain chips will be used since they will very significantly reduce the power required and provide for a highly efficient system. To adopt a fatalistic attitude towards this development is irresponsible, and we should want to leave the decision making in the hands of technocrats, corporations and governments.

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Legal (Continued from Page 6) should reassure those who worry about thoughtless disposition of embryos. RESOLVE, the support group for people facing infertility, has come out in support of federally funded stem cell research.

In sum, if it becomes possible to use public money for stem cell research, the NIH rules that would apply are, if anything, overprotective of potential donors. In the private sphere, the standard protections for informed consent that pertain to any research setting are sufficient to ensure that couples are making the decision whether or not to donate their spare embryos in ways that are consonant with their values.

Genetically modified (Continued from Page 2)

I would argue that the truth lies between these two views. Clearly, it is a mistake to think that a sense of moral repugnance or anxiety is sufficient to end debate. However, it is not irrelevant to the debate either. Analysis of these moral concerns and using them as a way to frame issues may be useful in a way that a simple risk-benefit analysis will miss. For example, an important source of concern is not merely risk, but such questions as, who is exposed to the risk? Who has the power to make decisions about that risk? Is the scientific community accountable to the public? These and other questions must be addressed as central to debates over genetically modified organisms. The sources of moral concern must be explored and addressed if we are to move forward with a technology that offers both promise and pitfall.


Ethicist (Continued from Page 3)

sufficient time to seek transfer of the patient or court intervention — which they chose not to do.

All treatments and monitors were withdrawn and JB died peacefully in the presence of his family.