



from the director's desk

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A surgeon operating from 250 miles away. AI detecting skin cancer better than human dermatologists. Robots as companions for dementia patients.¹ Sci-fi fodder or the latest bioethics headline? Oftentimes, it is difficult to separate the two. The pace of innovations at the cutting-edge of medicine, science, and technology can be overwhelming with the unrelenting evolution of R&D, challenging the efforts of even the most devoted tech junkie to stay up-to-date. Some are awe-inspiring in their potential, others profoundly disturbing. Amidst this ongoing challenge to be aware of technical innovations, I suggest, lies another challenge for bioethics reflection: these developments are straining the boundaries of our traditional bioethical paradigms. In the language of applied ethics, conceptual policy vacuums are beginning to emerge. Existing paradigms offer insufficient guidance for this new generation of technologies.

Those aware of the history of bioethics clearly recognize its origins within the exigencies of the clinical context and bedside care. The moral dilemmas of the nascent field of bioethics emerged amidst an explosion of therapeutic technologies and interventions that radically reshaped the ability of modern medicine to extend and improve the quality of human life and health.

Perhaps less familiar, is that bioethics also emerged in the midst of research controversy. Alongside those early clinical developments, human subjects research was embroiled in a series of scandals, such as the Tuskegee Syphilis trials, leading up to the publication of the Belmont Report. While the principles enshrined by Beauchamp and Childress may be the governing paradigm framing contemporary bioethics, for all but a few the historical context of these research scandals and the conceptual precedence of the Belmont Report are largely forgotten. A parallel account could be given with the emergence of genetic ethics following the discovery of the double helix structure of DNA and the growing concern over the potential of genetic engineering in the 1970s. From its earliest years, bioethics was not merely a continuation of medical or clinical ethics, but also research ethics, in its exploration of the implications of biotechnology and with it the remaking of humanity. Both were important considerations even in the formative years of bioethics and somewhat more in line with the expansive sense in which either Van Rensselaer Potter or Fritz Jahr (depending on your initial ascription of the term's origin) first coined the term 'bioethics.'

But just as many of the questions of bioethics are conceptually distinct between medical ethics and biotechnology, so too I believe is a distinct set of questions surrounding emerging technologies that are straining the limits of our traditional paradigms for bioethical engagement. For several years here at the Center we have suggested two categories of bioethical issues: Bioethics 1.0 and Bioethics 2.0. Bioethics 1.0 includes the boundary of human life issues, such as beginning of life and the end of life. *When does life begin? What are appropriate endings for life?* Bioethics 2.0 moves to address the questions of the remaking of humanity. *What does it mean to be human?* In one sense, these are chronological shifts from early questions to more contemporary questions. That said, bioethics clearly asked questions about the remaking of humanity long before the Human Genome Project.

Within this broader context of bioethics, we could speak of a new conceptual revolution in the technological turn both in recent bioethical discourse and within American culture as a whole. This technological turn marks not just a conceptual shift in bioethical questions, but also one that I would argue is chronological. As I have described in other contexts, in the technological turn our bioethics paradigm is challenged, as we confront the question of *"What does it mean to be human in an age of advanced technology?"* And, to do so well, it demands that we must examine this within the context of human futures both in the general sense of our individual and societal futures (or desired futures) and from a theological sense in our ultimate (eschatological) future.

It may be clear that the precipitating events of many of the early bioethical controversies involved technological developments in biomedicine, such as the medical ventilator and various assisted reproductive technologies. While some of these biomedical technologies exacerbated issues that long existed in the clinical

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setting, they generally did so by exaggerating more traditional beginning- and end-of-life concerns.

The 1990s and early 2000s, however, marked the rise of the biotech age through stem cell research, human cloning, and developments in genetics along with their accompanying ethical issues that emerged not from the clinic, but from the research lab. Here we begin to see that some of those early emphases on genetics and research ethics returned to the forefront of bioethical inquiry, forcing a broader set of ethical considerations. Increasingly concerns raised by biotechnology pressed beyond merely therapeutic interventions to the pursuit of regenerative medicine and beyond (e.g. animal-human hybrids), and with it the bounds of bioethics began to overflow beyond the convention of a biomedical paradigm of bioethics.

In the intervening years we have seen other transitions to the nature of medicine itself. A primary orientation toward the provision of care and comfort has given way to an orientation toward cure and technique. Broader trends toward medicalization and technological solutionism are reconfiguring historic conceptions of the nature and goal of medicine. But, these are lagging indicators of the broader technological revolution with the ubiquitous arrival of information and communication technologies.

The pervasive use of technology along with exponential increases in computational and storage capacities further exacerbated these trends challenging longstanding conceptions of the clinical encounter and bedside care. We see the rising influence of bioinformatics and Big Data, along with electronic medical records, telemedicine, and robotic surgery. In the realm of genetic and genomic research, advances toward precision medicine and personalized care stand alongside concerns about genetic privacy and genetic determinism.

Beyond these clinical applications, though, we see the Bioethics 2.0 questions maturing as various emerging technologies move to the forefront. Questions arising from developments in virtual and augmented reality, nanotechnology, synthetic biology, neuroprosthetics and human-computer interfaces, robotics, and the potential of artificial intelligence. These developments require technical competence in technological arenas often foreign to those in medical subspecialties and the biological

sciences. Consequently, the family resemblances of traditional bioethical issues with reproductive technology or the beginning or end of life appear to offer little guidance to issues raised in these emerging quarters.

We also see this in the convergence of previously disparate areas of inquiry that now force us to address questions about human futures. From the ethics of patients, and their physicians and other healthcare professionals, to prospects of regenerative medicine, and on to concerns of AI and existential risk. From catastrophic scenarios and risk assessment to broader questions of technology and society. Is it an overclaim to suggest that despite all of their amazing technical advances contemporary medicine, science, and technology are in a crisis at the limits of bioethics? Fundamental questions of the mere instrumentalization of nature and the remaking of humanity seem rather far afield from the domain of bedside care.

And yet, while these developments might be cause for pessimism, Bioethics 2.0 presents an opportunity. In order to take advantage, though, requires that we do more than just say, 'no.' Rather, we must be ready to offer a positive statement of what we actually are *for*. Bioethics 2.0 leads us to ask fundamental questions about what it means to be human, of being and remaining human in the midst of a medically, scientifically, and technologically sophisticated society. As we face the power to refashion our individual and common humanity, it forces us to ask about human futures. And, in asking about human futures, we must discuss values if we are to be intellectually honest. Whether these come from ideologies, worldviews, or dare I suggest theology. It gives us the opportunity to engage in a broader kind of technology assessment that forces us to discuss the kind of world we are hoping to live in, something for which that I think we have a lot to bring to the table. ●●●

- 1 Rose Eveleth, "The Surgeon Who Operates from 400km Away," *BBC*, May 16, 2014, <http://www.bbc.com/future/story/20140516-i-operate-on-people-400km-away>; Tom Bryant, "AI Rivals Human Dermatologists at Detecting Skin Cancer," *PC Magazine*, January 27, 2017, <http://www.pcmag.com/news/351394/ai-rivals-human-dermatologists-at-detecting-skin-cancer>; Andrew Griffiths, "How Paro the Robot Seal Is Being Used to Help UK Dementia Patients," *The Guardian*, July 8, 2014, <https://www.theguardian.com/society/2014/jul/08/paro-robot-seal-dementia-patients-nhs-japan>.

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