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Life after SuperBabe

In the 30 years since the birth of the world's first 'test tube' baby, *in vitro* fertilization has become commonplace. The next three decades could bring equally transformative technologies.

She arrives in the delivery room of a British hospital just before midnight, weighing 3.4 kilograms — a routine birth for a baby who is anything but. Her parents keep a copy of the newspaper to mark her birthday: 25 July 2038.

She is just what they dreamed of, of course, because they did everything medically possible to make sure of it. They had her genome sequenced by plucking off a cell or two when she was an embryo, just as they did for the cluster of other embryos produced by the *in vitro* fertilization (IVF) process. They chose her when the Baby's First Four Letters™ analysis at the clinic said that this particular embryo had the best odds of growing up to be thin, happy and cancer-free …

If this 30-year-hence scenario seems entirely plausible, it is because of what happened 30 years ago this month, when the first baby created by IVF was born on 25 July 1978. The papers called her SuperBabe. Her parents called her Louise Brown. Since then, what once seemed incredible and controversial has become commonplace. Some 4 million babies have already been born via IVF. So in this issue, *Nature* asks experts in reproductive medicine to speculate on what the next three decades might hold (see page 260). Some of the techniques promise to be equally transformative, if they come to pass.

Consider, for example, what would happen if researchers learn to grow artificial sperm and eggs from other body cells (see *Nature* **452,** 913; 2008). They would have abundant raw material for IVF, and could potentially bring about an end to infertility altogether. As that scenario would also lead to a bountiful supply of embryos, genetic screening could become a necessity — and the door would open wider to allow genetic enhancement and modification of germ cells and embryos.

Already, modern societies are entering an era of personalized genetics, in which anyone can pay for a read-out of known risk genes — or, soon, a complete personal genome sequence. These technologies will make their way into the fertility clinic. True, with thousands of genetic risk variants contributing to multiple different conditions, no embryo will have the perfect genetic future. But these techniques could allow parents to create a top-five wish-list of the characteristics they most want for their child — avoiding, for example, the Parkinson's disease that plagues the family — and choose the embryo most likely to meet those criteria. Or the parents may focus on non-health-related aspects such as intelligence and ambition; the ethical debate about genetic selection is likely to intensify over the next few years, as it should.

Meanwhile, safety concerns about IVF have still not evaporated, even after 30 years. Although it is unlikely that IVF does any major harm, more subtle problems may become apparent only when very large numbers of children are followed into middle age or beyond. Yet few such studies have been initiated. There are almost no large registries tracking children born via IVF, and even less information on children subjected to more recent techniques such as preimplantation genetic diagnosis. Such long-term studies are expensive and difficult because the privacy of parents and children must be maintained, and many will choose not to participate. Nonetheless, such registries should be a priority — even more so as the next generation of assisted reproduction techniques comes online. Yes, prospective parents may have to accept risks — but they should at least know what those risks are.

"Already, modern societies are entering an era of personalized genetics."

Also not resolved in the past 30 years is how to ensure that the appropriate safety and ethical requirements are satisfied. One model is Britain's widely admired Human Fertilisation and Embryology Authority, which has the legislative backing to set rules and enforce them (see page 280). In the absence of such regulation, as in the United States, the onus is on doctors to prove that they are committed to transparency, safety and the best outcome for both prospective parents and their children.

What is certain is that our future newborn on her birthday will be oblivious to these debates and to the method of her creation. Her existence will demonstrate that nothing is sacred in human biology — and researchers should ensure that nothing is diminished about human reproduction by starting it in the lab. ■

Templeton's legacy

The Templeton Foundation's exploration of science and faith merits tolerance, not outright rejection.

When a wealthy individual seeks to leave a legacy through scientific philanthropy, researchers usually greet such generosity enthusiastically. But the death of investment mogul John Templeton marks an unusual, and notable, exception. At the time of his passing last week, Templeton had poured some US$1.5 billion into the John Templeton Foundation, which funds research at the intersection of science and spirituality. Critics have maintained that the foundation needlessly conflates science and faith, with some calling for an outright boycott of Templeton funding.

Templeton was a deeply spiritual, albeit unorthodox, individual (see page 290). He lived a life firmly rooted in the Christian traditions of modesty and charity. Yet he was also a great admirer of science, the undogmatic practice of which he believed led to intellectual humility. His love of science and his God led him to form his foundation in 1987 on the basis that a mutual dialogue might enrich the understanding of both.

This publication would turn away from religion in seeking explanations for how the world works, and believes that science is