In 2011, football quarterback Peyton Manning went on the road to seek out stem-cell "treatment" for his neck. He wasn't alone: many high-profile athletes and desperate (but less famous) patients left the United States seeking interventions available in countries with less rigorous regulation. They didn't necessarily know what kind of cells they were getting, whether there was any evidence the intervention worked, or whether anyone understood the risks they were taking. So why did they do it?

Part of the answer may lie in the Latin phrase argumentum ad novitatem, the appeal to the new. A powerful force in Western culture, it seeps into our lives from many sources. The very word "news" suggests how important novelty is to our information media, including reporting on emerging therapeutic possibilities. When combined with patients' determination to obtain therapies for orphan or incurable diseases, novelty's hold on the imagination can be powerful indeed. In the 19th century, for example, patients were a gullible market for myriad inventions using the novel technologies of electricity, magnetism, and radiation to "cure" everything from obesity to depression. Medical tourism, too, has been seen before — consider patients' treks to Mexico in the 1970s to obtain a so-called cancer treatment made from crushed apricot pits.

Given the stories about amazing potential and early breakthroughs in laboratory and animal models, gene editing may trigger another wave of medical tourism. We should take steps now to guard against future gene-editing tourism by developing professional norms, fostering collaboration among national regulatory bodies, partnering with patient-advocacy groups to develop accurate, credible information sources, and working to devise responsible research protocols and patient-monitoring measures.

Medical tourism is not necessarily a bad thing. It can simply be the search for a standard therapy at lower cost or with a shorter waiting period, or one already well regulated elsewhere but not yet here. But it can also mean seeking unapproved interventions available in countries with weak or nonexistent regulation. Sometimes it's driven solely by hope and desperation; at other times, it carries a tinge of the libertarian call for a right, at least of the terminally ill, to try investigational drugs.

In the field of regenerative medicine, an energetic effort has been mounted to circumvent federal regulatory authority over the
development, approval, and monitoring of purported stem-cell therapies. U.S. clinics have sprung up offering various “treatments” that they argue merely represent the practice of medicine using a patient’s own tissues and therefore aren’t subject to the jurisdiction of the Food and Drug Administration (FDA). The FDA and the federal courts disagree. But clinics advertise online, promising cures that have little or no basis in publicly available evidence. Attempting to escape federal enforcement, some recruit patients within the United States but then have interventions delivered in locations where the laws are less problematic. Their claims of recovery can only fuel demand, despite efforts by the Institute of Medicine and others to help patients separate real from sham therapies, despite new FDA enforcement initiatives, and despite reports of lawsuits concerning serious adverse events, including death.

Demand has also been driven by the overwhelming media coverage of stem-cell research. At first, the field’s potential was highlighted in coverage of the debates over federal funding for work involving embryonic stem cells, with articles often failing to distinguish clearly between those cells and other kinds of stem cells, some of which were already in therapeutic use. As the political conflicts settled, coverage shifted to attempts at clinical trials and treatment monitoring.

Gene editing may be at risk for the same phenomenon. Whereas stem-cell research offers the promise of regenerating or replacing tissue, gene editing is an avenue toward altering tissue at the genetic or epigenetic level. Although gene editing has been around since the 1990s, using zinc-finger nucleases (ZFNs) and transcription activator–like effector nucleases (TALENs), the simplicity of the clustered regularly interspaced short palindromic repeats (CRISPR)-Cas tools introduced in 2012 has led to a surge in press coverage, fueled by a combination of political controversy over a potential application involving manipulating human embryos and excitement about the range of possible somatic cell uses. An opinion piece calling for a moratorium on germline editing while public discussion proceeds led to a frenzy of coverage and commentary, plus a National Academies initiative that includes an international summit and a consensus study committee.

CRISPR-Cas9 was hailed by *Science* as the breakthrough story of the year. News quickly emerged of experiments in mice suggesting applications for treating Duchenne’s muscular dystrophy. But headlines such as “Gene Editing Offers Hope for Treating Duchenne Muscular Dystrophy, Studies Find” (*New York Times*) in major newspapers and popular science sites may lead patients to believe the cures are just ahead. And with legitimate reports of in vitro and animal-model successes in such conditions as blindness, is it surprising that when patients read “Researchers Bring Gene Editing to Patients with Deadly Diseases” (*San Jose Mercury News*) they think the cures are already here? Not everyone reads past the headline.

Adding to potential confusion over the state of applications of CRISPR-Cas gene editing, both TALENs and ZFN gene editing have had promising results in two settings—a small trial to increase HIV-infected patients’ resistance to the virus and an effort to treat leukemia in one child. The *Today Show* duly reported that “Gene-editing technique treats baby girl’s leukemia,” crowing, “It’s got all the elements of a movie script — a dying baby, desperate parents, and a team of doctors with a completely untried and highly experimental treatment.” The message of hope bolstered the impression that cures are available for other diseases mentioned in media headlines, and the experimental nature of successful efforts dovetails with a growing perception that regul-
latory pathways are too slow (even as the FDA adds ever more ways to approve or provide access to investigational therapeutics more quickly).

Add to the mix a dose of stem cells, and one has a recipe for more medical tourism, fed by clinics seeking profits and patients seeking cures. When older gene-editing technologies were used to engineer intestinal stem-cell organoids in the search for cystic fibrosis treatment,4 a headline on futuremedicine.com read, “Fixing stem cells via genome editing: hope for cystic fibrosis?” If new is better, then new-squared, with two high-profile fields combined to address chronic, degenerative, and fatal diseases currently lacking cures, may be well nigh irresistible to patients and to clinics that would abuse their trust.

It will take a concerted effort by researchers, journal editors, companies, investors, and the media to find the fine line between hope and hype and to keep explaining why the best way to find safe, effective cures is through the careful steps of clinical trials and treatment monitoring. Editors need to ensure that headlines are more carefully written, scientists need to be careful about how they allow themselves to be quoted, and regulators need to collaborate with one another and with patient groups, so that misleading claims on the Internet can be checked or withdrawn. On the research side, national academies of science and medicine in Europe, Asia, and the United States have begun projects examining potential applications, regulatory pathways, and means to predict and measure precision, accuracy, and off-target effects. And proposals are being made regarding educating patients before any gene-editing–therapy trial begins.5

Participation in responsibly designed research is not at odds with promoting innovative medicine; it provides the data needed to confirm that innovative methods are effective. Nor is it at odds with compassion or an awareness of the different risk–benefit balance at play in terminal illnesses, which is why regulators provide pathways for access to investigational products. But the absence of good research undermines any effort to separate real from illusory therapeutic claims. Patients may be tempted by Willie Nelson, who “can’t wait to get on the road again,” but real progress is more like the Beatles’ “long and winding road.”

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