each plays in tumor development and identify driver mutations.

"The faster we know the drivers, the faster we'll be able to develop and test new medicines that are directed at the genes or the proteins produced by those mutations," says Jacks.

In the future, he says, this genome-editing tool may even make it possible to correct cancer-causing mutations. "If you can do genome editing *in vivo*, which is what we've done, could you correct cancer-predisposing mutations in humans?" Jacks wonders. "That's not going to happen tomorrow, but down the road, it's not out of the realm of possibility." ■

PD-1 Inhibitor Approved for Melanoma

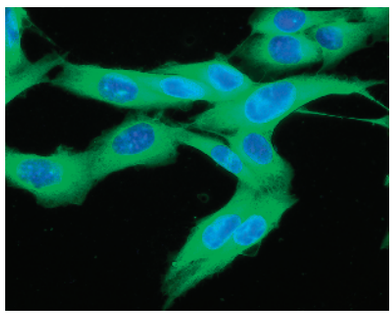
The FDA's accelerated approval of pembrolizumab (Keytruda; Merck) on September 4 will likely make a swift difference in melanoma care, according to several experts.

The drug, which turns off the immune modulator PD-1, was approved for use as a second- or third-line therapy, after the immune therapy ipilimumab (Yervoy; Bristol-Myers Squibb) no longer works, and, for BRAF V600-mutation–positive patients, after developing resistance to a BRAF inhibitor.

Pembrolizumab shows a 24% response rate and causes fewer serious side effects than ipilimumab, and yields durable results in most patients who respond, says Jeffrey Weber, MD, PhD, a senior member and director of the comprehensive melanoma research center at the H. Lee Moffitt Cancer Center in Tampa, FL, who has led studies of pembrolizumab.

"It's a major advance," Weber says. The drug offers "great benefit for patients, humongous potential for combinations with other immunotherapies and other therapies, and it's not very toxic—you can safely treat people in their 80s."

Weber says his experience with pembrolizumab has been positive, and he predicts that the drug will soon be approved as a first-line therapy as well. However, he does not believe that oncologists will try pembrolizumab for first-line treatment or in other types of cancer until the FDA expands its use.



Merck's PD-1 inhibitor pembrolizumab received FDA approval for the treatment of melanoma (above) in September. A similar drug from Bristol-Myers Squibb, nivolumab, may soon follow suit.

"I don't think you're going to see a lot of off-label use of such an expensive drug," Weber says. Estimates suggest the drug will cost $125,000 a year.

Industry experts expect a second anti–PD-1 drug, nivolumab (Bristol-Myers Squibb), to follow pembrolizumab to market in the United States in a few months.

Bristol-Myers Squibb and its partner, Ono Pharmaceutical, filed suit in federal court against Merck the same day pembrolizumab gained FDA approval, claiming Merck violated its patents. Merck denies the charge and says it expects to win the challenge.

"Getting out of the gate first is a massive advantage" for Merck, says Rachel Webster, MSc, PhD, senior director of oncology with Decision Resources Group, a health care information company headquartered in Burlington, MA, which surveys doctors.

Oncologists are well informed about pembrolizumab and will be quick to use it, Webster explains. Once they get used to prescribing it, some might be less inclined to switch to nivolumab.

The real competitive advantage, Webster says, will come from winning approval in the first-line, or treatment-naïve, setting, as well as in other cancers, such as non–small cell lung cancer and squamous cell carcinoma of the head and neck.

"The race," she says, "has only just begun." ■

For more news on cancer research, visit *Cancer Discovery* online at http://CDnews.aacrjournals.org.

NOTED

- **The U.S. Congress approved a stopgap measure to fund the federal government from October 1 through December 15.** The measure will continue funding for the NIH and NCI at their 2014 levels. Congress will work to finalize the fiscal year 2015 budget after the November elections.
- **Medivation and Astellas Pharma announced that the FDA approved Xtandi (enzalutamide) for the treatment of men with metastatic, castration-resistant prostate cancer** (CRPC) who have not received chemotherapy. The drug was initially approved in August 2012 for use in patients with CRPC who had previously received docetaxel.
- **AbbVie and Google's biotech company Calico have agreed to partner and spend up to $1.5 billion to produce therapies for age-related diseases, including cancer.** Calico will handle research and development, and AbbVie will be responsible for late-stage clinical trials and commercialization of products.
- **General Electric received approval from the FDA to sell its 3-D breast-imaging devices in the United States.** 3-D mammography combines X-rays taken from multiple angles to create more-detailed images than traditional mammograms. Until now, Hologic, which received FDA approval in 2001, has been the only company allowed to sell the machines in the United States.
- **The Cancer Drugs Fund will get an extra £160 million ($265 million) and be extended to 2016 to help patients in England receive cancer medications** that the country's National Health Service would not ordinarily cover. The infusion of cash will bring the fund, which has helped more than 55,000 cancer patients since it was set up 4 years ago, to £280 million a year.
- Darmstadt, Germany's **Merck KGaA announced that it will buy Sigma-Aldrich of St. Louis, MO, for $17 billion.** Merck KGaA, which operates under the umbrella brand EMD in the United States and Canada, creates high-tech products in the pharmaceutical and chemical sectors. Sigma-Aldrich develops and manufactures a range of life science products, such as chemicals, biochemicals, and equipment for life science research.