Electrical Therapy Shows Promise for Lung Cancer but Fails for Ovarian Cancer

Tumor-treating fields therapy uses electricity delivered via a wearable device to kill cancer cells.

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Tumor-treating fields (TTFields), a new technology that uses low-intensity electrical fields to kill cancer cells, improved overall survival for patients with metastatic non-small-cell lung cancer, according to a recent report in The Lancet Oncology. However, the treatment did not improve survival for people with advanced ovarian cancer, according to a company announcement.

TTFields therapy, delivered by a portable device, takes advantage of cancer cells' unique electrical properties and rapid growth to disrupt processes critical for their survival while sparing healthy cells. The Optune device, developed by Novocure, is currently approved for the treatment of glioblastoma brain cancer and mesothelioma.

For glioblastoma, the Optune device works by producing alternating electrical fields that penetrate into the brain and polarize cells, causing them to die before they can replicate, according to a report from the University of Colorado Cancer Center, which conducted clinical trials of the device. Brain cancer patient Adam Hayden wrote a blog post describing his experience using Optune.

TTFields therapy is also being evaluated for other difficult-to-treat malignancies, including lung cancer, ovarian cancer and pancreatic cancer.

The Phase III LUNAR trial (NCT02973789) enrolled 276 people with metastatic non-small-cell lung cancer that had progressed despite platinum-based chemotherapy; about 30% had previously received checkpoint inhibitor immunotherapy. About two thirds were men, and the median age was 64 years. They were randomly assigned to receive TTFields alone or in combination with standard therapy consisting of either docetaxel chemotherapy or a checkpoint inhibitor. TTFields therapy was delivered continuously via patches on the chest, and patients were instructed to wear the device at least 18 hours per day.

As described at the 2023 American Society of Clinical Oncology Annual Meeting and in the new Lancet Oncology report, people who used the device experienced a "statistically significant and clinically meaningful" improvement in overall survival. The median overall survival time was 13.2

months for patients who added TTFields versus 9.9 months for those who received standard therapy alone. In the sub-group of patients who received a checkpoint inhibitor, the median overall survival time was 18.5 months for those who added TTFields therapy versus 10.8 months for those who did not. But in the subgroup that received docetaxel, the median overall survival time was 11.1 months versus 8.7 months, respectively.

One-year survival rates were 53% for patients treated with TTFields versus 42% for those who received one of the standard therapies alone. Among those with longer follow-up, three-year survival rates were 18% versus 7%, respectively. However, progression-free survival and overall response rates (tumor shrinkage) did not differ significantly between the groups.

The treatment was generally safe, though severe adverse events were common: 59% in the TTFields group and 56% in the standard therapy control group. About 70% of TTFields recipients reported side effects, mostly mild to moderate dermatitis and other skin and subcutaneous tissue problems.

“These data suggest that TTFields therapy is efficacious in metastatic non-small-cell lung cancer and should be considered as a treatment option to manage the disease in this setting,” the study authors concluded.

“This is a promising development for a population of patients with limited treatment options, lead investigator Ticiana Leal, MD, of Emory University’s Winship Cancer Institute, said in a Novocure press release. The results suggest that tumor treating fields therapy can safely be used along with standard systemic therapies to extend survival without reducing quality of life.” She also noted that the LUNAR trial is the first study in more than seven years to show a significant improvement in overall survival for people with metastatic non-small-cell lung cancer after platinum chemotherapy.

But TTFields therapy did not work as well for ovarian cancer. The Phase III INNOVATE trial enrolled 540 patients with platinum-resistant ovarian cancer who had received up to five lines of prior treatment. The participants were randomly assigned to receive TTFields together with paclitaxel chemotherapy or paclitaxel alone.

Novocare recently announced that the study did not meet its primary endpoint. Overall survival time was 12.2 months in the TTFields group versus 11.9 months in the standard therapy group, which was not a significant difference. However, the study did suggest a survival benefit in patients who had only one line of prior therapy, which “could merit further exploration,” according to the company.

“We see treatment exposure and number of prior therapies are relevant and can drive outcomes, and we will leverage these data as we explore and identify new opportunities to treat this deadly disease,” said investigator David O’Malley, MD, of Ohio State University’s James Comprehensive Cancer Center.

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