more PDT agent goes to where doctors want it.

Photofrin II does have limitations of its own. It takes up to 2 months to leave the body, meaning patients must avoid direct sunlight during that period. But data from clinical trials of a potential new PDT agent called benzoporphyrin derivative (BDT) indicate that BDT clears from the body much faster. The trials, by researchers from QLT, Massachusetts General Hospital, and the British Columbia Cancer Agency, which were presented in June at a meeting of the American Society for Photobiology, showed BDT builds to proper levels within hours of being injected and clears from patients within a week. "The patients can be treated with both drug and light on the same day," says Anderson, an author on the report.

That may make for an elegant scenario of selective site-specific drug action, but the real question is whether BDT, or other PDT compounds, will help sick people in new and better ways. "I'm a skeptical optimist," says Anderson. He expects the Canadian approval of Photofrin II to spur studies that ought to provide the quality data needed to see just how good or limited PDT will be. Photofrin II is now under evaluation in Canada, the United States, Europe, and Japan for cancers of the lung, stomach, cervix, and esophagus.

Some of the most provocative data comes from Japanese researchers who, since the 1980s, have been testing PDT for the early detection and treatment of lung cancer. If cancer cells are present in a patient's lung, the PDT agent concentrates in the cancerous tissue and sends out a beacon of fluorescence to doctors. Not only does this signal a cancerous presence, but doctors can then begin treatment by activating the agent with light. "They showed that you could eradicate early stage lung cancers this way," says Dougherty, whose early work in purifying hematoporphyrin-based compounds made the new era of PDT possible.

But most of the PDT trials done to date, which have involved an estimated 5000 patients over a period of 15 years, have been either too small or have lacked enough controls for researchers to determine how well PDT compounds work in comparison to existing or competing treatments. In the United States, Anderson adds, the trials often have involved desperately ill patients who have not responded to conventional therapies, and so their value in early cancer treatment remains difficult to ascertain.

Eli Glatstein, head of radiation oncology at the University of Texas Southwestern Medical Center at Dallas, notes that the trials need to produce more reliable data before therapeutic value can be assessed. "What the field has lacked on the whole is a compulsive and meticulous attention to the physics and dosimetry of this sort of therapy," he says. Still, he is confident that PDT therapy will find its place in the armamentarium of anticancer therapies. Says Glatstein: "Its ideal use will be for cancers close to the surface of an organ and probably in conjunction with surgery." Bruce A. Chabner, director of the division of cancer treatment at the National Cancer Institute, also cautions that PDT "may not have far-reaching potential." But he seconds Glatstein's assessment that it could serve at least as an adjunct therapy for cancers at or near tissue surfaces.

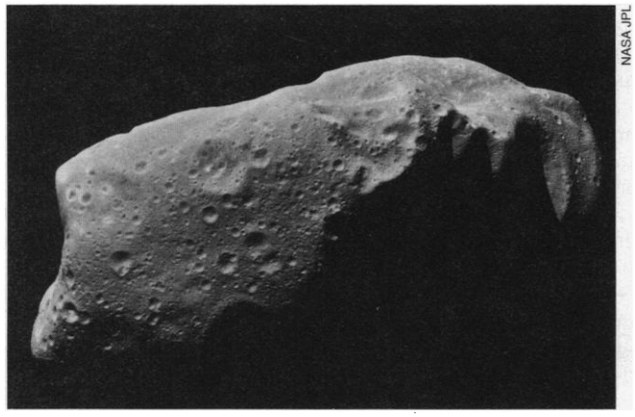
Before PDT even gets to that stage, however, it will have to overcome another obstacle having to do with the lasers used for activating the drug molecules. At the moment the only lasers available require special power supplies, are complicated to operate, and are bulky. But at least one company, PDT Inc. in Santa Barbara, is already bench testing a new solid-state diode laser designed specifically for PDT. Their experimental laser plugs into a wall and fits into a box the size of a large briefcase. As a result of new techniques like that, the light at the end of the PDT tunnel seems to be getting brighter and bigger.

–Ivan Amato

SPACE SCIENCE

Galileo Reveals a Badly Battered Ida

To some, it looks like the lower jaw of a cosmic serpent (try turning this image upside down). But to planetary scientists, the second closeup ever of an asteroid, taken by the Galileo spacecraft on 28 August as it was passing through the asteroid belt beyond Mars on its way to Jupiter, is more than a cosmic Rorschach test—it's a scientific goldmine. "It's a beautiful picture," says Clark Chapman of the Planetary Science Institute in Tucson, a member of the Galileo scientific team. Because of its abundant detail, says Chapman, "There's an order of magnitude more information here for geologists" than in the first ever asteroid closeup: the image Galileo returned after flying by the 19-kilometer-long asteroid Gaspra in 1991 (*Science*, 1 January, p. 28).



NASA JPL

A hard life. Asteroid Ida has taken more hits than expected.

The glacial rate of data transmission through Galileo's crippled communications system delayed the release of the image (a mosaic of five frames) until last week, and scientists are still in the midst of deciphering the asteroid's history from signs of surface wear. But already the battered visage of the 52-kilometer-long asteroid has researchers suspecting that it has been kicking around the asteroid belt for several hundred million years, a good deal longer than some had expected.

Galileo's bonanza of detail comes courtesy of a combination of serendipity and gutsy planning. Ida's large size provided more surface to look at, and a fortuitous lighting angle highlighted many details. But in addition, the space probe's handlers, emboldened by their success at getting Gaspra in the cross hairs, held their fire until the probe was just 3500 kilometers from Ida and then hit it with six overlapping shots. At that range, the camera achieved a resolution of 35 meters, almost twice as good as the sharpest image of Gaspra.

The advanced age suggested by that pockmarked surface is surprising to many researchers because of Ida's history. Ida belongs to a small flock of asteroids in similar orbits, the debris from the breakup of a large parent asteroid. Some researchers saw signs in these asteroids' spin rates and other properties indicating that the breakup was recent. Ida, they expected, would be considerably younger than Gaspra, which has been estimated to have been broken off a larger asteroid about 200 million years ago. Instead, says Peter Thomas of Cornell University, Ida "looks at least as old as Gaspra," if not older.

Revealing as the first glances at this image are, there's much more to come. For now, color and infrared images and other data are stored aboard the spacecraft; they will be transmitted next spring when Earth's motion brings Galileo closer, speeding transmission of the stored data. Then planetary scientists can start getting even more familiar with Ida.

–Richard A. Kerr