that a massive asteroid or some other energetic object has since slammed into Gaspra with nearly enough force to smash it into bits, he says. Astronomers have identified similar grooves on Phobos, a Martian moon roughly the same size as Gaspra.

Even Galileo's highest-resolution images and spectroscopic data, which the craft can't transmit until sometime next year, may not reveal Gaspra's interior composition, several astronomers note. The softened features of the asteroid's surface suggest that a layer of dust or soil 3 to 10 meters deep may blanket Gaspra, making it difficult to probe the interior, Veverka says.

Further analysis, he adds, may settle a debate over whether Gaspra and similar asteroids contain material that has remained basically unchanged since the solar system formed. Some scientists contend that blasts of heat may have altered the composition of these asteroids so that iron and other dense materials concentrate in the core while lower-density minerals lie closer to their surfaces.

A first look at a composite of the four Galileo images reveals subtle color differences that suggest at least some variation in Gaspra's chemical composition. And Robert W. Carlson of the Jet Propulsion Laboratory, who leads studies with Galileo's near-infrared mapping spectrometer, says the low-resolution data he received hint at compositional differences between the asteroid's northern and southern hemispheres. Finding fresh craters that expose subsurface material might offer the best hope of studying the interior, Veverka adds.

If Galileo had flown past a larger asteroid – as intended before the 1986 Challenger disaster delayed the craft's launch – it could have measured the object's gravitational tug, enabling researchers to infer its chemical makeup, Veverka says. Such studies must now await future space missions that will rendezvous with an asteroid rather than whiz past it, says William K. Hartmann of the Planetary Science Institute in Tucson, Ariz.

– R. Cowen

Kawasaki aneurysms: A lingering threat

Some children with Kawasaki disease develop a large and potentially lethal aneurysm, a ballooning of a coronary artery. A Canadian research team now reports that this weakening in the vessel wall can persist, putting the child at continued risk of a heart attack.

Kawasaki disease causes fever, sore throat, and inflammation of various tissues. Scientists don't know what triggers this generally rare childhood illness, which disproportionately strikes youngsters of Asian ancestry. The acute symptoms usually subside after two or three weeks, but cardiac complications can linger.

Last week, at the American Heart Association's 64th scientific sessions in Anaheim, Calif., cardiologist Teiji Akagi of the Hospital for Sick Children in Toronto presented data on 537 youngsters with Kawasaki disease, the largest series of North American Kawasaki patients ever reviewed.

Seventy of these children had developed coronary artery aneurysms, which were identified by a variety of imaging methods. In reviewing the patients' medical records, Akagi and his colleagues discovered nine small aneurysms, 40 moderate ones and 21 large ones, measuring about one-third of an inch wide.

For most of these children, the coronary aneurysm eventually vanished. Two years after diagnosis, all nine of the small aneurysms had disappeared; five years after diagnosis, 80 percent of the moderate aneurysms had regressed. But the five-year picture for the large aneurysms remained disappointing: All 21 persisted, and nine children with this condition suffered a heart attack. Five of the nine had a heart attack within one year of their Kawasaki diagnosis, Akagi says.

The turbulent blood flow in a large aneurysm may lead to a blood clot, which can block the coronary artery, causing a heart attack, he explains.

Some of the children received anti-inflammatory medication during the early stage of the illness. Akagi's group found that aneurysms were most likely to subside in children treated with gamma globulin, a protein produced by the body to fight inflammation. Two years after diagnosis, 80 percent of the 16 gamma globulin patients showed no sign of aneurysm. Five years after diagnosis, only half of the 46 kids treated with aspirin, another anti-inflammatory drug, showed aneurysm regression.

The cardiac risk faced by children with large aneurysms suggests a need for more aggressive treatment, he adds. These youngsters may benefit from bypass surgery, in which surgeons replace the weakened coronary artery with a healthy vessel, Akagi says.

Even patients who show no sign of persistent aneurysm must be monitored closely for coronary artery damage, warns Hirohisa Kato, who studies Kawasaki disease at Kurume (Japan) University. When the aneurysm heals, the body adds scar tissue to the artery wall – a process some researchers fear may heighten the risk of heart attack, Kato says.

– K.A. Fackelmann

Illuminating tiniest microlaser on a chip

The notion of a laser beam shooting out of a disk small enough to fit easily inside a red blood cell seems more the stuff of science fiction than the laboratory. But advances in technology have put just such a device well within reach.

Investigators at AT&T Bell Laboratories in Murray Hill, N.J., have now fabricated and successfully operated disk-shaped semiconductor lasers measuring 2 to 10 microns in diameter. Commercial semiconductor lasers, such as those used in compact-disk players, typically measure 250 microns across.

AT&T Bell Labs

Scanning electron micrograph of disk-shaped semiconductor microlaser.

In terms of volume, the new devices are the smallest semiconductor lasers yet produced, says Sam McCall, who designed the disk lasers. McCall and his collaborators described these devices earlier this month at a meeting of the Optical Society of America, held in San Jose, Calif. Further details will appear in APPLIED PHYSICS LETTERS in January.

Resembling a miniature thumbtack, the novel microlaser consists of a layered disk only 400 or so atoms thick mounted on a slender pedestal. The disk – a thin layer of indium gallium arsenide sandwiched between layers of indium gallium arsenide phosphide – absorbs light from a helium-neon laser to generate coherent infrared radiation at wavelengths ranging from 1.3 to 1.5 microns.

"We've been working at low temperatures where we cool the substrate with liquid nitrogen," McCall says. "But we've also warmed them up, and they've worked at a few degrees above freezing."

These microdisk lasers operate in what researchers call a "whispering gallery" mode, named for the way words whispered at one location near the interior wall of a circular, domed chamber can be readily overheard anywhere else along the wall. Like these echoing whispers, photons travel along a disk's edge for long periods with little loss.

"In the perfect geometry, the beam would come out along the edge and would sort of spray out in the plane of the disk," McCall says. "We can change the ideal geometry a little bit to get the beam to go where we want it to. For example, by putting grooves at just the right places on the top surface, we can get the beam to come out vertically."

– I. Peterson