

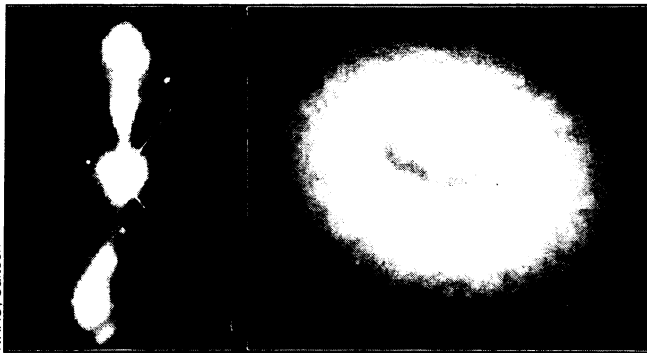
Orbiting Hubble eyes active galaxy's disk

The Hubble Space Telescope has captured the sharpest image ever obtained of a dusty disk of material encircling a galaxy's unusually violent heart.

Based on studies from the ground, astronomers speculate that the disk may fuel a suspected black hole at the galaxy's center. But even if the black hole connection doesn't prove correct, says Walter J. Jaffe of the State University of Leiden in the Netherlands, the Hubble image provides the closest look yet at the center of a type of galaxy — called an active galactic nucleus (AGN) — that has a luminous, energetic core.

The new image depicts a doughnut-shaped disk surrounding the core of the giant elliptical galaxy NGC 4261. Hubble's picture of the disk, whose outer edge measures 300 light-years across, is one of several taken by the telescope in an effort to probe the fireworks at the heart of a variety of AGNs. Jaffe, who analyzed the image with colleagues including Holland C. Ford of the Space Telescope Science Institute and Johns Hopkins University in Baltimore, announced the findings at a press briefing last week.

Jaffe and his team decided to include NGC 4261 in their Hubble survey of AGNs



Far left: Composite ground-based image of NGC 4261, in the Virgo cluster, shows two oppositely directed jets emerging from its nucleus. Left: Hubble image reveals dusty disk circling the center.

because of intriguing ground-based observations — notably a pair of radio jets some 88,000 light-years long streaming out from the galaxy's core. Such activity suggests that a superheavy object — possibly a black hole 10 million times the mass of the sun — spews out energy from a tiny region at the galaxy's center. And although visible-light studies had only imaged the galaxy's core as a fuzzy blob, they did indicate that dust patches surround the center — even though elliptical galaxies contain little dust.

Jaffe says he agrees that the disk of dust imaged by Hubble "doesn't prove any more than we've already known from the ground, that there's a black hole there." But, he adds, it suggests "we're seeing the fuel tank, we're seeing the carburetor . . . that are driving the central engine [black hole]." Compelling evidence of a black

hole, he notes, awaits measurements of the orbital velocity of material near the galaxy's center — a study Hubble can't perform until a late 1993 repair mission corrects its flawed optics.

John L. Tonry of the Massachusetts Institute of Technology says it remains uncertain whether the visible disk, lying tens of light-years from the galaxy's center, can indeed fuel the suspected black hole. Jaffe calculates it would take about a million years for material in the disk to get sucked into the hole.

The disk's size has surprised some researchers. Anne L. Kinney of the Space Telescope Science Institute suggests that large, cooler disks may circle AGNs that have relatively less luminous cores, such as NGC 4261, while smaller, hotter disks may orbit the cores of brighter, more quasar-like AGNs.

— R. Cowen

White cells and the formation of plaque

T-cells, a type of immune cell that helps defend the body against disease, may play a villain's role in the drama of atherosclerosis, the buildup of plaque that clogs arteries and causes heart attacks.

That's the surprising conclusion reported last week at the American Heart Association's 65th scientific sessions by Augusto E. Villa and William E. Braun of the Cleveland (Ohio) Clinic Foundation.

The researchers' interest in the immune system and atherosclerosis began several years ago, when Braun made an intriguing observation while conducting a study of kidney transplant patients. He discovered that patients with very serious atherosclerosis had significantly fewer white cells circulating in their bloodstream than did patients with clear vessels.

Braun, Villa, and their colleagues designed a study specifically to test that preliminary finding. They recruited 20 middle-aged men and women with coronary artery disease and 20 middle-aged men and women without diseased arteries, who served as a control group. None of the participants had other conditions, such as AIDS, that would alter the white cells found in their blood, Villa says.

All the recruits had undergone angiography, an X-ray examination of the blood vessels that can reveal plaque blocking the arteries. The team noted that 11 of the 20 patients had the most severe type of coronary artery disease, in which two or three arteries supplying the heart with blood are clogged. The researchers took blood samples and measured the number of white cells in the bloodstream.

Compared to the controls, the 11 people with the most severe heart disease had 35 percent fewer T4 lymphocytes, a particular type of T-cell, in their blood, the researchers concluded. And these patients also showed a 25 to 30 percent decrease in a specialized T4 lymphocyte called T4 helper-inducer cells, Villa reported at the meeting in New Orleans.

Villa points out that people with severe atherosclerosis have fewer circulating T4 lymphocytes because these white cells are buried within the plaque clogging their arteries. Scientists believe that fatty lipids such as cholesterol first stick to the inner lining of the artery and then attract T4 lymphocytes (SN: 10/5/91, p.220). The lymphocytes then secrete powerful substances called lymphokines, which may speed

up the progression of atherosclerosis, Villa speculates.

The findings may eventually lead to a cheaper way of identifying people with very severe atherosclerosis, Villa says. Rather than sending everyone with symptoms of coronary artery disease to get an expensive angiogram, doctors may be able to pick out high-risk patients with an inexpensive white-cell test. To confirm the suspicion of disease, people with significantly decreased T4 lymphocytes would then go on to receive an angiogram, he adds.

A blood test for T4 lymphocytes could reduce the number of angiograms performed in the United States, Villa points out. A study by Thomas B. Graboyes of the Lown Cardiovascular Center in Brookline, Mass., and his colleagues in the Nov. 11 JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION suggests that an estimated 50 percent of all angiograms are unnecessary.

The Cleveland study raises questions about how the T4 lymphocytes (and in particular the T4 helper-inducer cells) aid and abet plaque buildup. If researchers can find out how these immune cells accelerate the disease process, they may be able to design new treatments aimed at slowing down or preventing atherosclerosis, Villa adds.

— K.A. Fackelmann