Temperature Pill

Prototypes of an ingestible thermometer capable of measuring and relaying internal body temperatures are undergoing clinical testing at Maine (Portland) Medical Center and animal testing at the Johns Hopkins Medical Institutions Baltimore, Maryland. Commercial units are expected to be available this year.

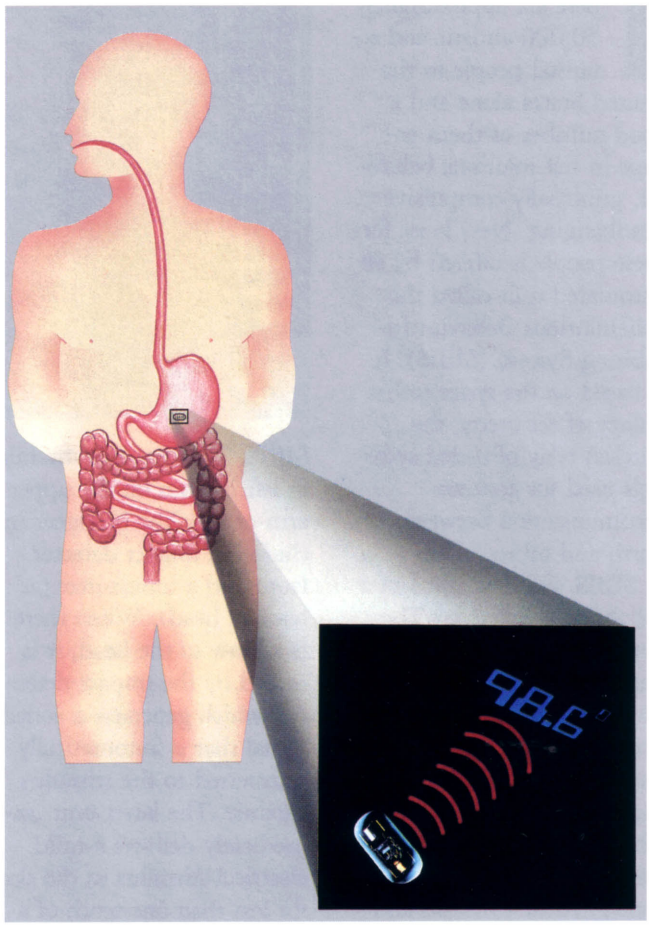
The thermometer was developed by The Johns Hopkins Applied Physics Laboratory (APL), Laurel, Maryland, under the direction of Dr. Russ Eberhart, in collaboration with NASA's Goddard Space Flight Center as a techology utilization project. Human Technologies, Inc. (HTI), St. Petersburg, Florida will manufacture and market the capsule-like system under a licensing agreement with APL.

Formally known as the Ingestible Thermal Monitoring System (ITMS), the thermometer incorporates several aerospace technologies, such as integrated circuit miniaturization, sensor and microbattery developments, and telemetry, technologies originally developed for transmission of coded data signals to Earth from orbiting spacecraft.

The ITMS was developed as a means of getting internal temperature readings for treatment of such emergency conditions as dangerously low (hypothermia) and dangerously high (hyperthermia) body temperatures. Extreme accuracy of temperature readings is important in treating such cases. Where the average thermometer is accurate to one-tenth of a degree Centigrade ITMS is off no more than one hundredth of a degree, and it provides the only means of obtaining deep body temperature.

The system has additional applicability in fertility monitoring, incubator monitoring, and some aspects of surgery, critical care, obstetrics, metabolic disease treatment, gerontology (aging) and food processing research.

The three-quarter-inch silicone capsule, which contains a telemetry system, microbattery and a quartz crystal temperature sensor, is inserted vaginally or rectally, or swallowed by the patient to make its way through the digestive tract. The sensor "reads" the internal temperature and telemeters its information to a receiving coil outside the body, then on to the computer. ITMS monitors continuously for the one-to-three days it takes the capsule to pass through the body.



APL is working on an advanced, four-channel capsule system that will simultaneously monitor temperature, heart rate, inner body pressure and acidity.