Viral DNA creates immortal breast cells

Researchers have discovered that genetic material taken from the human papillomavirus (HPV) causes healthy human breast cells to proliferate indefinitely in culture, providing an "immortal" cell line for studying the first stages of abnormal cell growth, which can lead to cancer. The researchers say their finding also raises the intriguing possibility that HPV plays a role in the development of at least some breast cancers – a notion some scientists discount as unlikely.

In the past, researchers have detected HPV – a DNA-containing virus that commonly causes a type of skin wart – in cervical cancer tissue (SN: 11/11/89, p.310). Others have used HPV *in vitro* to provoke unrestrained growth of healthy skin cells.

But the search for a similar method to transform healthy breast cells in the laboratory proved fruitless until researchers at Boston's Dana-Farber Cancer Institute injected healthy breast epithelial cells with DNA extracted from HPV types 16 and 18, both linked with cervical cancer. At that point, no one had suggested a possible link between HPV and breast cancer.

To the scientists' surprise, the treated cells continued to grow for the two years they were studied. Normal breast epithelial cells grow for much shorter periods in culture and then stop. Vimla Band, Ruth Sager and their colleagues report the finding in the January PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES (Vol.87, No.1).

Although not malignant, the cells proliferated in the same manner as benign tumors, Sager says. Scientists believe such abnormal cells are at risk of becoming cancerous when genetic mutations in the cell trigger uncontrolled growth and the ability to spread to other body parts. In the future, the researchers intend to induce genetic changes in HPV-treated cells to study very early cell abnormalities that may lead to cancer.

Their observations have led them to wonder whether HPV exposure might somehow make breast cells prone to developing cancer, though Sager says that's pure conjecture at this point. Her team used DNA extracted from HPV, and not the whole virus. There is no evidence that the whole virus can infect breast cells in the body, says HPV researcher Peter M. Howley of the National Cancer Institute. Nonetheless, the Boston researchers believe the potential link between HPV and breast cancer should be explored. They are now searching for evidence of HPV DNA in cancerous human breast tissue. – *K.A. Fackelmann*

'Secret' panelists disclosed

Reversing an earlier decision, the National Institutes of Health (NIH) has released the names of the two scientists who recently joined its ongoing inquiry into the allegations of scientific misconduct and fraud surrounding a research paper in the April 25, 1986 CELL. The paper described a novel mechanism for immune system regulation.

Stewart Sell, an immunologist at the University of Texas Health Science Center in Houston, and William R. McClure, a biochemist at Carnegie Mellon University in Pittsburgh, joined the original three-member panel in October and are now actively investigating the dispute, Suzanne W. Hadley, acting director of NIH's Office of Scientific Integrity, told SCIENCE NEWS. NIH initially refused to release their names because of the "extreme publicity" surrounding the dispute, Hadley says.

The original panel released a report last February that cleared the CELL coauthors of "fraud, misconduct, manipulation of data, or serious conceptual errors." But NIH reopened its inquiry in April as allegations continued to surface, including congressional testimony from Secret Service agents who reported that someone had altered dates on laboratory pages describing key experiments published in the scientific paper (SN: 5/13/89, p.294).

A research team led by Thereza Imanishi-Kari, then at MIT, and David Baltimore of the Whitehead Institute for Biomedical Research in Cambridge, Mass., authored the 1986 paper. NIH's first attempt to form a panel of outside experts to investigate the matter was derailed in early 1988 when a congressional panel noted that two of the appointed scientists had close professional ties to Baltimore.

– *K.A. Fackelmann*

Unreal reactions elucidate energy flow

As computers get more powerful and less expensive, more chemists spend time in the world of make-believe. By simulating chemistry in a computer, researchers have now developed a detailed account of how fleeting energy fluctuations in an imaginary solution manage to initiate equally imaginary chemical reactions. They say the work provides a new window on the flow of energy in real-world reactions.

The chemists modeled an atom exchange reaction in which a molecule made of two identical atoms transfers one of them to a single atom of the same kind. Composed of chlorine-like atoms, the simulated reactants were dissolved in a solvent composed of 100 nonsticky, argon-like atoms. The chemists told the computer to arrange the pseudo-argon atoms in a liquid-like phase, insert the two reactants into the solvent at randomly selected locations, and then set all of the particles into motion.

"The reaction is simple, but many [real] reactions follow a single step like this," says Ilan Benjamin of the University of California, Santa Cruz, who helped perform the simulations in Kent R. Wilson's laboratory at the University of California, San Diego. Even complicated reactions often involve a series of single-atom exchanges, Benjamin notes.

The simulations offer "a particularly simple but revealing picture of energy flow from the solvent bath to the reaction system," the researchers conclude in the Jan. 17 JOURNAL OF THE AMERICAN CHEMICAL SOCIETY. The energetic journey that culminates in the modeled reaction begins as fluctuations in the solvent. Through atomic collisions within the solvent, the fluctuations focus energy into miniature hotspots involving several solvent atoms. Through solvent-reactant collisions, these high-speed atoms in turn transfer some of their energy to the reactants, which express the energy in a variety of vibrational, rotational and linear motions. By converting this kinetic energy into potential energy, the reactants get closer to each other until they surmount the reaction's energy barrier and finally exchange an atom.

Until the 1970s, experimental and computational difficulties prevented chemists from rigorously probing the physical events that occur at superbrief time scales. Scientists could say little, for instance, about exactly how energy in a solution would flow into dissolved reactants and push them over a specific reaction's energy barrier. Such processes take place in less than a quadrillionth of a second.

"Now we can ask more detailed questions of what form the energy takes during a simple reaction," Benjamin says. The computer simulations enable researchers to avoid many of the experimental difficulties and expenses of looking at the superfast energy flow of chemical reactions.

Benjamin notes that a few experimentalists now have lasers with pulses fast enough to probe the energy flow in real chemical reactions. However, simulations are more easily and variably controlled because they can incorporate evolving theories of how solvent and reactant species store energy, how atoms and molecules move in an environment of atomically derived pushing and pulling forces, and how solvents get reactants close enough to each other to actually react. – *I. Amato*