Biomedicine

Dirty dancing can be a pain in the neck

It's sinful, it's sexy, it's the latest dance fad — and it just might break your neck.

As the Latin American-inspired dance called the lambada sweeps northward, physicians from Miami to Montreal are beginning to see female patients with "lambada fractures" — broken vertebrae at the base of the neck. The breaks appear to result from the floor-grazing backbends performed by the female partner in this groin-grinding dance.

In a letter published in the March 21 NEW ENGLAND JOURNAL OF MEDICINE, three physicians from the Royal Victoria Hospital in Montreal caution fellow doctors to be alert for lambada fractures. Liane Philpotts Thomson, Lawrence A. Stein and William W. Fish report the case of a 24-year-old professional lambada dancer who came to them the day after a performance complaining of a sore neck. An X-ray showed the woman had broken off one of the spiny projections from her seventh cervical vertebra. The break had caused the natural bend in her neck to straighten out painfully. The doctors fitted her with a soft collar brace and told her to stay off the dance floor for four to six weeks.

The Montreal team suggests the injury arose from the patient's "frequent forceful flexions and extensions of her neck, along with controlled backward drops to the floor." They point to similar injuries suffered in the mid-1980s by breakdancers who spun on their heads.

Shocking treatment proposed for AIDS

Zapping the AIDS virus with low-voltage electric current can nearly eliminate its ability to infect human white blood cells cultured in the laboratory, reports a research team at the Albert Einstein College of Medicine in New York City.

William D. Lyman and his colleagues found that exposure to 50 to 100 microamperes of electricity — comparable to that produced by a cardiac pacemaker — reduced the infectivity of the AIDS virus (HIV) by 50 to 95 percent. Their experiments, described March 14 in Washintgon, D.C., at the First International Symposium on Combination Therapies, showed that the shocked viruses lost the ability to make an enzyme crucial to their reproduction, and could no longer cause the white cells to clump together — two key signs of virus infection.

The finding could lead to tests of implantable electrical devices or dialysis-like blood treatments in HIV-infected patients, Lyman says. In addition, he suggests that blood banks might use electricity to zap HIV, and vaccine developers might use electrically incapacitated viruses as the basis for an AIDS vaccine. For scientists working to create contraceptive devices that repel sperm with electricity, the new study also hints at a lifesaving side effect: protection against HIV.

Stalking a vaccine for skin cancer

Taking some of the hair of the dog that bit you may prove sound advice when it comes to skin cancer.

David Berd, an oncologist at Thomas Jefferson University in Philadelphia, injected 24 patients who had metastatic melanoma with pieces of their own tumors coated with the immune-system sensitizing agent dinitrophenyl. This month, at the First International Symposium on Combination Therapies in Washington, D.C., he reported that 14 of the volunteers developed an increased immune response to their cancers.

In an earlier study using uncoated tumor cells, Berd found that five of 40 patients showed significant tumor regression. Despite melanoma's extremely high mortality, one patient is still alive eight years after diagnosis, he says. These studies "provide some basis for optimism" about the prospect of developing a vaccine to boost immune responses to melanoma and possibly other cancers, he concludes.

Physics

Ivars Peterson reports from Cincinnati at a meeting of the American Physical Society

Totally organic electronics

Once regarded as little more than laboratory curiosities, semiconductors fashioned from organic molecules are starting to make an impression in an electronic world dominated by silicon-based circuitry. Aided by recent progress in preparing organic semiconductors with well-defined electronic characteristics, French researchers have now constructed and tested the first transistor fabricated entirely from organic materials.

The novel "field-effect" transistor consists of a thin film, made of a short-molecule analog of a semiconducting polymer known as polythiophene, deposited on a polymer base. A polymeric insulating layer separates the transistor's active parts from its electrodes. This transistor's most remarkable feature is its flexibility. It functions even when bent out of shape.

Although the performance of the organic transistor lags behind that of silicon-based devices, further research may bring it closer to practical applications. "We think we have a new, very promising class of organic semiconductors," says Francis Garnier, who developed the new transistor with co-workers at the CNRS Laboratoire des Matériaux Moleculaires in France.

A light look at foam

Anyone who has gazed into a foam-capped mug of beer has probably noticed that one can see through the beer but not through the foam. The foam's dense packing of tiny bubbles scatters light so effectively that very little passes directly through, giving the froth its familiar white color.

Douglas J. Durian and his collaborators at the Exxon Research and Engineering Co. in Annandale, N.J., have now exploited this effect to probe the structure and dynamics of three-dimensional foams. By analyzing in detail how a foam scatters light, they have obtained the first direct, noninvasive measure of the average size of bubbles deep inside a foam. They have also managed to track the rearrangement of the bubbles during a process known as "coarsening," in which large bubbles grow at the expense of smaller bubbles, which shrink.

Applying the light-scattering technique to commercial shaving cream, the Exxon team discovered that during the coarsening process, groups of neighboring bubbles usually remain locked in place even while the bubbles slowly change in size. However, these size changes introduce stresses that deform the bubbles. The stresses finally become large enough to induce a sudden rearrangement in which many neighboring bubbles quickly shift their positions and then settle into a new, quiescent state.

Having demonstrated that their technique can provide useful information about foam behavior, the researchers plan to try it on other foams to help determine what factors contribute to a foam's stability. They also want to study how bubbles move past each other when foams flow along a surface or through a pipe. Because foams play important roles in a variety of industrial processes, from beer brewing to oil drilling, the work may eventually yield better methods of tailoring foams for specific applications, the researchers say.

Buckyballs for scanning surfaces

How well the needle of a scanning tunneling microscope maps the contours of a given surface often depends on the precise geometry and size of the needle's tip. Researchers at Purdue University in West Lafayette, Ind., have now demonstrated that a tip capped with a single "buckyball" — a perfectly symmetric, spherical molecule consisting of 60 carbon atoms, more formally known as buckminsterfullerene — can serve as an extremely small, well-defined electron source that may be suitable for certain types of microscopy.