Capsules

Spot the Promoter

For people concerned about tumour promoters, there's good news and bad news. The good news is that scientists in the NRC's Biology Division's Cell Physiology Group think they are on to a quick and inexpensive method for identifying these agents which encourage cancer formation under certain conditions. The bad news is that promoters may be so common, ranging from caffeine to certain hormones in our bodies, that the test may have little practical value.

Dr. Alton Boynton, who has been conducting the tests as the first step in a more ambitious study of the biochemical mechanisms of tumour promoters, says carcinogens are the more serious problem. A carcinogen is a chemical which has been shown to change normal cells into cancerous cells. Sometimes, however, a carcinogen takes years, even decades, to induce cancer, or it only starts the cell on the road to cancer without finishing the job. That is where the tumour promoter comes in. It can speed up the cancer process or turn an "initiated" cell into a cancerous one. In either case, says Dr. Boynton, the promoter must arrive at a specific stage in the cancer process or it will not have any effect.

The test for promoters (which can also be applied to carcinogens) is based on the fact that cancerous cells proliferate in an environment low in calcium ions while normal cells do not. The chemical in question is added to the initiated cells in a low-calcium medium. Presumably only promoters induce cell replication.

So far the results look promising. Boynton says about thirty compounds have been tested with the results on another thirty still to come. Of the twenty-five known promoters already tested, all have induced cell proliferation. They have included caffeine, saccharin, and hormones such as calcitonin and parathyroid.

Boynton now plans to study the chemicals which induce cell proliferation further in an attempt to learn exactly how they work. As for the promoter test, he says more research will have to be done before it could replace the more lengthy and expensive procedures which involve exposing live animals to promoters. But he sees little chance of such a test being used to regulate tumour promoters because they are so common, and, by themselves do no harm. Boynton says carcinogens, which initiate and often carry the cell through the cancer process, present the greater danger.

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Concert Vibrations

When the staff at an Ottawa arena became worried by floor vibrations during rock concerts, they called in a vibrations expert from NRC. Gerry Pernica from the Division of Building Research was asked to measure how much the floor shakes and determine whether the fans in the stands and the workers underneath them are safe.

Such an assignment has never been undertaken in Canada before. Only in Britain has a similar investigation been conducted when a researcher measured the vibrations caused by the crowd's "pogoing" at a Who concert in Edinburgh. Pogo is the form of dance where everyone jumps strait up and down on the spot.

During a three-hour Dooby Brothers concert in Ottawa, Pernica collected data from three vibration sensors, or accelerometers, which he attached to the beams under the stands. The arena was sold out that night, and, as the listeners got excited by the music, their rhythmic dancing, jumping, and foot stomping shook the foundations perceptibly. Pernica recalls that it was definitely scary sitting in a cubbyhole under the seats and watching the floor above bounce to the beat.

Back at the NRC lab Pernica analyzed his recorded data and got the information he needed. Using floor displacements and the physical dimensions of the arena beams, he calculated the amount of vertical load the structure was being subjected to. Vertical load includes two elements: the static load, or the weight of the spectators sitting on the stands, and the dynamic load, which is the force