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LETTER FROM CANBERRA

Arming the antibody

Australian researchers report success with radioactive sera against an experimental tumor

Radioactivity does kill cancer cells. It also tends to destroy surrounding tissues. Experiments have been designed in recent years in an effort to get around the side damage, targeting the radioactivity more precisely. None, so far, has done the whole job.

A team of Australian researchers believes it is possible to exploit the apparent ability of some tumors to stimulate antibody production to this end. And they are optimistic enough about their results, in experiments with an induced tumors in mice, to be talking about an immunoradioactive anti-cancer serum in the foreseeable future.

It is possible to produce antibodies against a great variety of cells and micro-organisms, but these do not always end in biological damage to those structures. The experimenters decided to try to increase their effect by binding them with an isotope of fairly short half-life.

The leader of the pathology-organic-chemistry team, at Melbourne University, Prof. J. M. Swan, describes his work as aimed at arming an antibody with radioactive teeth.

Prof. Swan, his co-worker Prof. R. C. Nairn and their team report that an antibody serum so treated localizes a binding of radioactivity on the surface of its target antigen or cell.

The first steps in the testing of the concept used iodine 131 with a specific anti-tumor serum against induced Ehrlich ascites tumor in mice—a standard type of experimental tumor in laboratory work. The application of this preparation was successful in eliminating the tumor cells, while a non-radioactive iodinated anti-serum proved to have no effect.

The team was not satisfied with the use of iodine 131 as a destructive agent since it emits both beta and gamma rays and would afterwards be localized in the thyroid with the possibility of damage there. Victims of accidental fallout from the 1954 Bikini H-bomb test suffered thyroid damage from ingested I-131.

After searching through the range of short-lived isotopes with the necessary bonding characteristics the workers chose an organic phosphorus—P-32—which is a pure beta emitter and has about double the energy of I-131 and a longer half-life.

The selection was made also to avoid the possibility of the agent being metabolized in the body to phosphate, which would concentrate the radioactivity in the bone marrow, damaging blood cell production.

"This means a very promising beginning to the exploration of possible immunoradiotherapy of cancer in human patients," Prof. Nairn says.

Prof. Nairn and his team are seeking new sera against various human cancers, but they believe the similarity of normal to cancerous tissue will make the production of specific antibody difficult.

Without sufficient specificity, the antibody would not be able to concentrate enough radioactivity on the cancer cell to kill it. That problem, plus the still-open question of whether an antibody could even carry enough radioactivity to be therapeutic, leads other researchers to question the Australians' optimism, but not to question their work.

Prof. Nairn says, however: "We feel that for some cancers at least the goal (an immunoradioactive serum) is not an impossible one . . . we already possess antibodies with specific binding activity for some normal human and animal organs and tissues."

The team leaders also make the point that immunoradioactive treatment carries some risk of side-effects: Some minimally irradiated adjacent cells might develop harmful mutation. Cancer risk is greater in people who have been irradiated.

However, Prof. Nairn argues, desperate diseases call for desperate measures and the slight possibility of another cancer developing from treatment is no justification for withholding that treatment and allowing the first cancer to go on.

A specific destructive radioactive agent would also have great potential for experimental physiology and pathology. It could complement surgery and also be used against diffuse components of organs and organisms which were out of reach of surgery.

The team has already established that the antibody remains attached to target tissue for some weeks, and has made sure that the bonds with the radioactive chemical will be strong enough to keep it in place for the same length of time.

Lennard Bickel

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