NZ scientists find new cancer drug

Ruth Hill

Two Kiwi scientists have discovered a new class of anti-cancer medicines that kill tumours without the side effects of traditional therapies.

Medicinal chemist Jeffrey Smaill and cancer biologist Adam Patterson, from Auckland University, say their “prodrugs” - inactive compounds triggered by the body’s own metabolic processes - have already shown dramatic results in the lab.

Their discovery, announced at an international cancer drug conference in Boston this week, is being heralded as a major breakthrough in fighting hard-to-treat cancers, like those of the lungs, brain, pancreas and stomach.

Dr Smaill, who has spent 10 years synthesising the compounds, said they worked by targeting the proteins in tumours that tell cells to multiply.

“The main problem with previous drugs developed to target these proteins was they also affected normal, healthy tissue in the skin and gut, causing serious side effects such as severe diarrhoea, rashes, nausea and vomiting, which limited the dose a patient could tolerate.”

The surface of a healthy gut is renewed every 48 hours - about the same rate as a tumour.

For half a century scientists have known that two-thirds of tumours have patches containing low levels of oxygen, called hypoxic tumour cells, which are harder to treat with radiation and more likely to spread.

Dr Patterson said the prodrugs actually use this feature against the tumour, by zeroing in on hypoxic cells before they activate.

“If we can target and kill these cells we should be able to dramatically improve the outcome for cancer patients,” he said.

Unlike other drugs that only stay in the tumour for a few hours, the prodrug sticks to the tumour for over 72 hours.

“It’s very common for tumours to start regrowing after you stop administering this type of cancer drug. But after we stopped doses of this prodrug, the tumours still hadn’t regrown 30 days later.”

Their collaboration, which began in 2003, has been supported by the Wilkins Centre for Molecular Discovery, the Foundation for Research, Science and Technology and the US-based biopharmaceutical company Proacta, which owns the rights to commercialise the compounds.

After getting approval from the United States Food and Drug Administration, the pair hope to begin clinical trials in humans in late 2011.

Cancer Society chief executive Dalton Kelly said an anti-cancer drug without side effects would be “a wonderful thing, if it comes to fruition”.

“Of course, it will be several years down the track. But meanwhile, we are fortunate to have some of the world’s leading cancer researchers working in New Zealand and we need to make it as easy as possible for them to stay here.”

How do prodrugs work?

- The prodrug targets proteins in solid tumours called human epidermal growth factor receptors (HERs), which are involved in cell growth.
- The compound is only activated in cancer cells with low oxygen levels, leaving normal, healthy tissue unaffected.
- An “inhibitor” is released, gluing itself to the HER protein and permanently shutting off the signal to the cancer cell to multiply.

Jeffrey Smaill: Medical chemist

Adam Patterson: Cancer biologist.
HEALTH SCIENCE

Pro-drugs fight cancer without all the cons of traditional therapies

Two Kiwi scientists have discovered a class of anti-cancer medicines that kill tumours without the nasty side-effects of traditional therapies.

Cancer biologist Adam Patterson and medicinal chemist Jeffrey Smaill, of Auckland University, say their “pro-drugs” – inactive compounds triggered by the body’s metabolic processes – have shown exciting results in the lab.

Their discovery, announced at an international cancer drug conference in Boston this week, is being heralded as a major breakthrough in fighting hard-to-treat cancers, like those of the lungs, brain, pancreas and stomach.

Smaill, who has spent 10 years synthesising the compounds, said they worked by targeting the proteins in tumours that tell cells to multiply.

“The main problem with previous drugs developed to target these proteins was they also affected healthy tissue in the skin and gut, causing serious side-effects ... [limiting] the dose a patient could tolerate.”

For half a century, scientists have known that two-thirds of tumours have patches containing low levels of oxygen, called hypoxic tumour cells, which are harder to treat with radiation and more likely to spread.

Patterson said the pro-drugs use this against the tumour, by zeroing in on hypoxic cells before they activate.

“If we can target and kill these cells we should be able to dramatically improve the outcome for cancer patients,” Smaill said.

Unlike other drugs that stay in the tumour for only a few hours, the pro-drug sticks to the tumour for over 72 hours.

“Af ter we stopped doses of this pro-drug, the tumours still hadn’t regrown 30 days later.”

Their collaboration, which began in 2005, has been supported by the Maurice Wilkins Centre for Molecular Biodiscovery, the Foundation for Research, Science and Technology and the United States-based biopharmaceutical company Proac ta, which owns the rights to commercialise the compounds.

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Cancer Society chief executive Dalton Kelly said an anti-cancer drug without side-effects would be “a wonderful thing”.

“Of course it will be several years down the track.”

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HOW PRO-DRUGS WORK

- The pro-drug targets proteins in solid tumours called human epidermal growth factor receptors (HERs), which are involved in cell growth. It is activated only in low-oxygen level cancer cells. Healthy tissue is not affected. An inhibitor is released, gluing itself to the HER protein, shutting off the “multiply signal” to cancer cells.
NZ scientists in cancer drug breakthrough

TWO Kiwi scientists have discovered a new class of anti-cancer medicines that kill tumours without the nasty side effects of traditional therapies.

Medicinal chemist Jeffrey Small and cancer biologist Adam Patterson from Auckland University say their “prodrugs” – inactive compounds triggered by the body’s own metabolic processes – have already shown dramatic results in the lab.

Their discovery, announced at an international cancer drug conference in Boston this week, is being heralded as a major breakthrough in fighting hard-to-treat cancers, like those of the lungs, brain, pancreas and stomach.

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