

Baking soda improves MRI

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Body's sodium bicarbonate used to catch cancer early

A chemical commonly called baking soda which is found naturally in the body could be used to improve detection of cancer with magnetic resonance imaging, reveals a study published in Nature.

Traditionally magnetic resonance imaging (MRI) detects water and fat in the human body. By boosting MRI sensitivity more than 20,000 times, using a scanning technique developed by GE Healthcare, researchers can now image the molecules that cancer cells use to make energy and to grow.

This level of precision could be used to detect tumours and to find out if cancer treatments are working effectively at an earlier stage.

Almost all cancers have a lower pH than the surrounding tissue. Normally, the human body has a system of balancing chemicals with a low pH, acids, and chemicals with a high pH, alkalis, to maintain a constant, healthy pH level. In cancer, this balancing system is disturbed, and the tissue becomes more acidic.

Currently, there is no way to safely measure differences in pH in patients, but spotting these areas of acidity could be used to find cancers when they are very small.

Working with mice, the team found a new way to measure pH levels using this very sensitive MRI technique with a tagged form of bicarbonate. Bicarbonate, or baking soda, occurs naturally in the body, where it is involved in the acid-alkali balancing system.

Lead researcher Professor Kevin Brindle, from Cancer Research UK's Cambridge Research Institute at the University of Cambridge, UK, said: "This technique could be used as a highly-sensitive early warning system for the signs of cancer. Establishing such tools is a major challenge in cancer research.

"By exploiting the body's natural pH balancing system, we have found a potentially safe way of measuring pH to see what's going on inside patients. MRI can pick up on the abnormal pH levels found in cancer and it is possible that this could be used to pinpoint where the disease is present and when it is responding to treatment."

Using MRI, they looked to see how much of the tagged bicarbonate was converted into carbon dioxide within the tumour. In more acidic tumours, more bicarbonate is converted into carbon dioxide.

First author of the study, Dr Ferdia Gallagher who is a Cancer Research UK and Royal College of Radiologists clinical training fellow, based at the University of Cambridge, said: "Although it's early days, if this technique proves to be safe and effective in cancer patients it has the potential to be a crucial tool in detecting cancer earlier - which is often the key to successful treatment."

Dr Gallagher, who is also a radiologist at Addenbrooke's Hospital in Cambridge, added: "Our technique allows the spatial distribution of pH to be imaged using MRI which is something that has not previously been possible in patients. This new method is important because the chemical we use isn't toxic and is already administered safely to humans."

Dr Lesley Walker, director of cancer information at Cancer Research UK, said: "It's really important that we find new ways of diagnosing cancer earlier and find out if drugs are working well in the body.

"So if clinical trials show that this technique is as safe and effective in cancer patients as we expect, this could be a very useful tool in the early detection of cancer and may save many lives."