

Curcumin's dual defence against disease



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The versatile herb turmeric has long been used in India to treat wounds and injuries, flavour foods, and colour foods and textiles. Now, scientists believe they know why curcumin, turmeric's main component, kills bacteria and protects against cancer.

Vakula Srinivasan of Bowling Green State University, Ohio, and Anthony Gorman at the University of Manchester used pulse radiolysis to generate radicals and excited states of curcumin, and study their reactions with oxygen and other molecules on timescales of less than a millionth of a second.

It is already known that curcumin protects against cancer as it inhibits lipid peroxidation - a chain of oxidative events involving light and lipid radicals formed from fatty acids. The Anglo-American team has shown that curcumin is an excellent radical scavenger. This is probably what makes it effective against cancer, explains Gorman.

Curcumin easily forms a free radical which is particularly unreactive towards oxygen, reports Srinivasan. 'The curcumin molecule acts like a shuttle or scavenger,' he explains, 'continuously removing damaging radicals, that may react with oxygen in lipid peroxidation.'

Like vitamins C and E, the two main antioxidants responsible for inhibiting free-radical damage in biological systems, the curcumin removes dangerous radicals, producing a particularly stable radical of curcumin, says Gorman. And significantly, vitamins C and E repair the curcumin radical, regenerating the curcumin molecule which can repeat the cycle, he adds.

Unusually, curcumin doesn't react significantly with singlet oxygen, unlike most other biologically important phenolic materials, says Srinivasan. This is good news as it will not promote oxidative 'stress', when it might itself form potentially carcinogenic products.

Srinivasan established in previous work that in light and oxygen, curcumin is able to kill bacteria like *Salmonella typhimurium*, *Escherichia coli* and *Staphylococcus aureus* completely within 15 minutes. Now he thinks he knows why: curcumin absorbs light and reacts with oxygen to give singlet oxygen, or hydrogen peroxide, which kills the bacteria.

'On the whole, curcumin looks like an ideal food additive, although I'm not advocating a spoonful a day,' he concludes.