**New Radiation Mechanism May Ward Off Cancer, Oil Spills And Terrorism**

Radiation similar to that used to treat cancer may someday help clean up environmental disasters such as the Gulf oil spill and detect explosive powder hidden underneath clothing.

The novel radiation mechanism developed by University of Central Florida physicist Richard Klemm and a team of scientists in Japan also could help doctors more directly target cancer and many other diseases, reducing the impact of treatments on healthy parts of the body.

The mechanism operates in the Terahertz gap – the range between microwave and infrared frequencies. Until now, scientists have not been able to tap into these frequencies with much success.

"It's a small range, but these frequencies are the important ones absorbed by biochemical molecules," Klemm said.

Instead of simply using radiation to kill tumors, this technique may offer a more direct way track down what's ailing a patient. "Our mechanism could be used to detect the amino acids in DNA, which may be linked to specific diseases. That means it's a good diagnostic tool."

Medicine is just the beginning. The mechanism could be used to track miniscule traces of explosives hidden under clothing, a tool national security experts may find useful in preventing terrorist attacks. The technique also could be used to trace and potentially destroy specific chemicals that damage the environment and our bodies.

Results from the study have been published in *Physical Review Letters*, one of the most prestigious and highly ranked physics journals.

"These applications are still years away, but this is significant progress and we're very excited," said Klemm, a pioneer in the field of layered superconductivity.

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The co-authors of the study (Manabu Tsujimoto, Kazuhiro Yamaki, Kota Deguchi, Takashi Yamamoto, Takanari Kashiwagi, Hidetoshi Minami, Masashi Tachiki and Kazuo Kadowaki) are based at the University of Tsukuba. The city is home to more than 60 research institutes known for making breakthroughs in nanotechnology and physics.

Klemm, who grew up in Eugene, Ore., has taught at UCF since 2008. He has worked with two Nobel Prize winners and scientists in Russia, Germany, Canada, China and Japan. He has earned degrees from Stanford and Harvard universities.

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# AIR POLLUTION COULD INCREASE RISK OF SUICIDE

* 17:48 15 July 2010 by [**Peter Aldhous**](http://www.newscientist.com/search?rbauthors=Peter+Aldhous)
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Air pollution doesn't just make it hard to breathe – it may also increase the risk that people will take their own lives.

A new study in seven cities across South Korea has uncovered a clear association between suicide and spikes of particulate pollution. Meanwhile, researchers who in the 1990s linked air pollution to asthma in a large group of Taiwanese children have now found that those with the condition were subsequently more likely to have killed themselves.

Suicide is a big problem for South Korea, where the rate per 100,000 people rose from 14 in 1996 to 23 in 2006 – the largest increase in the developed world.

### Soot and suicide

To examine the role of pollution, researchers led by [Chang Soo Kim](http://medicine.yonsei.ac.kr/en/Departments/Basic_sd/Pre_Medicine/professor/docprofile.asp?sno=1655) of Yonsei University in Seoul linked records of more than 4000 suicides to measurements of PM10 – airborne particles with a diameter of 10 micrometres or less, which include the soot from vehicle exhausts.

Kim's team found that suicides were more common in the two days following a spike in pollution. They considered PM10 measurements on a scale from the highest and lowest levels recorded, calculating that people were 9 per cent more likely to kill themselves following a spike in pollution rising across the middle 50 per cent of recorded values. For people with cardiovascular disease, which has already been linked with particulate pollution, the increase was almost 19 per cent.

South Korea's cities, like many in Asia, are badly blighted by air pollution, and it is unclear whether the effect would be so dramatic in cities that have tighter pollution controls. "Further investigations of low-level exposure to particular matter are needed," says Kim.

### Breath and mind

The Korean study appears alongside one from a team led by [Ying-Chin Ko](http://english2.kmu.edu.tw/front/bin/ptlist.phtml?Category=16) of Khaohsiung Medical University in Taiwan. In the late 1990s, Ko and his colleagues found that high levels of air pollution were associated with asthma in more than 160,000 schoolchildren.

Following up the same group more than a decade later, the researchers show that suicides were more than twice as common among those with asthma – and the more severe their symptoms at the start of the study, the higher the risk.

Scientists have only recently started to study the relationship between respiratory disease and mental health, says David Callahan at the Centers for Disease Control and Prevention in Atlanta, Georgia. Last year, his team revealed that 7.5 per cent of [people with asthma in the US reported suffering serious psychological distress](http://www.ncbi.nlm.nih.gov/pubmed/19837824), compared with just 3 per cent of the population as a whole.

That's a concern, Callahan explains, because people with depression are known to be worse at managing chronic diseases by taking prescribed drugs and following other medical advice – potentially causing a spiral of physical and mental deterioration. "Now it is recognised that there is a relationship, we need to work out the chain of causality and the opportunity for intervention," he says.

Where air pollution is involved, the problem may not only be that as people's physical symptoms worsen, they become more distressed. Kim suggests that PM10s may also cause nerve inflammation, affecting mental health through a direct biological mechanism.

Journal references: [*American Journal of Psychiatry*](http://ajp.psychiatryonline.org/), Kim, DOI: 10.1176/appi.ajp2010.09050706, Ko, DOI: 10.1176/appi.ajp.2010.09101455