

Stomach Cancer Originates From Bone Marrow Stem Cells

A new study from Columbia University Medical Center finds that stomach (gastric) cancer originates from bone marrow derived stem cells (BMDC), rather than from stomach stem cells, as previously thought, bright-

surf.com said. The study, "Gastric Cancer Originating from Bone Marrow-Derived Cells" is published in the current issue of Science. "This was an unexpected finding, which may lead to a re-evaluation of current assump-

tions about how all cancers originate," said Timothy C. Wang, M.D., chief, Division of Digestive and Liver Diseases and Dorothy L. and Daniel H. Silberberg Professor of Medicine at Columbia University College of Physicians and

Surgeons and senior author of the study. "The implications of this study may lead to new methods of diagnosis and treatment of many cancers particularly those that have been linked to chronic inflammation such as stomach, esophagus,

lung, pancreas, liver, etc." A common assumption among cancer specialists is that most cancers originate from tissue stem cells for example, the gastric stem cells contained in the lining of the stomach. However, the

researchers suspected BMDC may contribute to the development or progression of cancer because they are frequently recruited to sites of tissue injury and inflammation, e.g., a typical site for cancer development. Results found that

chronic infection with Helicobacter pylori (known as H. pylori), a common type of bacteria known to cause inflammation and ulcers in the stomach and a known carcinogen, leads to the death of most normal stomach cells. As a result,

BMDCs arrive in numbers in an attempt to repair the site. These BMDCs, which are somewhat prone to undergo transformation, progress over time into stomach cancer cells. The research was conducted in mouse models.

New Look for Nanofabrication

Physicists in Germany have developed a new approach to atom lithography that can beat the classical diffraction limit by a factor of two.

According to PhysicsWeb.org, the technique, developed by Markus Oberthaler and colleagues at the universities of Heidelberg and Konstanz, exploits quantum aspects of the interaction between light and matter.

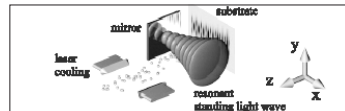
Standard approaches to atom lithography employ off-resonant standing waves. However, the diffraction limit of light restricts the minimum feature size that can be fabri-

cated with this approach to about half the wavelength of the laser beam used to create the standing wave.

Oberthaler and colleagues have now shown that nanostructures with smaller feature sizes can, in principle, be fabricated if the laser beam is resonant with an electronic transition in the atoms.

The experiment involves passing a tightly focused beam of chromium atoms through a resonant standing wave, which is produced by reflecting a linearly polarized laser beam from a mirror.

After passing through the standing wave, the chromium atoms are deposited onto a silicon



A collimated chromium beam impinges on a resonant standing light wave and subsequently hits a substrate. After deposition the substrate topography is analyzed with an atomic force microscope.

substrate and the resulting pattern is analyzed with an atomic force microscope (AFM).

The Heidelberg team found that nanostructures with feature spacing of half the wavelength of the laser light were produced when the laser was tuned far from its resonance frequency. However, when the laser was almost reso-

nant with a transition in the chromium atoms, a complex structure containing additional features--each separated by a quarter of the wavelength of the laser light--was seen.

According to the team, these features are produced by quantum interactions between the atoms and the laser beams, and by the quantum motion of the atoms.

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Dementia Linked To Long-Term Obesity

We didn't really need another reason to lose weight, but the news that as your body gets larger, your brain may be getting smaller, Time Magazine said.

That's a little overdramatic, to be sure, but it is now probably reasonable to add dementia to the ever-growing list of obesity-related illnesses. For some time, researchers have known that carrying a lot of extra weight is not only linked to chronic diseases like arthritis and cancer but may also be a risk factor for brain diseases like Alzheimer's. And now, using sophisticated brain scans, scientists may be a step closer to showing how that works.

University in Sweden and the Medical College of Wisconsin in Milwaukee followed nearly 300 women over a period of 24 years and then, when the women were between the ages of 70 and 84, performed C.T. scans on their brains.

Not surprisingly, body-mass index (or BMI, a ratio of weight to height) increased as the women aged. In addition, the women with the highest BMI turned out to be the most likely to have suffered atrophy, or wasting, of the temporal lobes of the brain.

In fact, the researchers found that for every 1-point rise in BMI, the risk of temporal-lobe atrophy increased between 13% and 16%. The temporal lobes,

which are often affected in Alzheimer's disease, play a role in memory, verbal expression and language comprehension.

Deborah Gustafson, lead author of the report, which appears in the current issue of Neurology, says there are several possible explanations for fat in the body leading to cell death in the brain.

For one thing, being overweight or obese is linked to hypertension, diabetes and high cholesterol, all of which contribute to blocking arteries and decreased blood supply to the brain. "Fat alone," she adds, "could be the problem, as it leads to increased levels of brain-attacking hormones, such as cortisol."

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