

[Login](#) | [Register](#)



Experience the Diversity
Register Now!

[Publications](#) [Sections](#) [News](#) [Community](#) [Multimedia](#) [Awards](#) [Subscribe](#)

[Search](#) [Advanced Search](#)

[Home](#) > [News](#)

[RSS Feeds](#) [Newsletters](#) [Bookmark](#)

[\[-\] Text](#) [\[+\]](#)

Researcher solves mystery about proteins that package the genome

Posted In: [Life Sciences](#)

By [EurekAlert](#)

Wednesday, October 7, 2009

TALLAHASSEE, Fla. -- A Florida State University College of Medicine researcher has solved a century-old mystery about proteins that play a vital role in the transfer of the human genetic code from one cell to another. The discovery could lead to finding new ways to help the body fight a variety of diseases, including cancer.



Email 0 tweets
 Print tweet

For more than a hundred years, the best scientific evidence supported a belief that histones -- responsible for packaging DNA inside the nucleus of cells -- are highly stable proteins not rapidly degraded by the body. Yet, researchers have not previously been able to explain why free histones, if they are not degraded as other proteins are, do not accumulate in large amounts within human cells.

Akash Gunjan, an assistant professor in the department of biomedical sciences, has found evidence supporting his hypothesis that there actually are two pools of histones: one used in packaging DNA that is very stable and remains in the cell for more than a year in some cases and the other made in excess by the cells to ensure that enough histones are available for packaging the DNA. Not having enough histones results in cell death. Those excess histones, Gunjan suggests, are rapidly degraded as are other proteins.

The discovery is important because it sheds light on the way the body is able to regulate proteins for various complex tasks. Such knowledge may allow scientists to learn how to manipulate protein regulation to fight cancerous cells and thwart other disease processes. Gunjan and co-authors Rakesh Kumar Singh, Marie-Helene Miquel Kabbaj and Johanna Paik, all from the College of Medicine, published their findings in the journal *Nature Cell Biology* (<http://www.nature.com/ncb/journal/v11/n8/full/ncb1903.html#a1>).

"This has major ramifications for all the different things the DNA does," Gunjan said. "Because if DNA contains genes and DNA is packaged around histones, then histones are at the most fundamental level regulating whether those genes are turned on or off."

If scientists are able to determine how genes for cancer and other diseases are turned on or off, it might lead to ways to help the body rid itself of or better control disease.

For decades scientists have been captivated by the way the body selectively uses proteins in essential functions, storing or disposing of them when they are not needed. For example, eating a hamburger requires a certain set of enzyme proteins for digestion. If the enzymes are not deactivated or degraded following digestion, the consequences would be disastrous.

"They'll start to digest things you do not want them to digest," Gunjan said. "After finishing your hamburger, if these enzymes started digesting proteins in your intestines, in your stomach wall and so on, that would not be a good thing."

To manage proteins when they are not needed, the body naturally degrades them through a process known as proteolysis. Histones in most cases, however, must be preserved for long periods of time because they make it possible to fold strands of DNA measuring about 3 feet in length within the microscopic nucleus of a typical human cell. Histones used in that process must be able to avoid degradation to preserve the body's ability to pass on its genetic code from cell to cell.

Advertisement

LABORATORY EQUIPMENT Webcast Series | Wednesday October 14, 2009

Analytical Techniques for Monitoring Bioethanol

Sponsored by:

REGISTER FREE

Latest News

[more](#)

[Establishing standard definitions for genome sequences](#)
33 minutes ago

[Chu, Locke, Browner Call for Comprehensive Energy Plan at Clean Energy Economy Forum with Business Leaders](#)
35 minutes ago

[DOE Announces \\$87 Million in Funding to Support Solar Energy Technologies](#)
35 minutes ago

[Man indicted for fraud over timber theft](#)
41 minutes ago

[No scientific link between childhood vaccines and autism](#)
1 hour ago

Advertisement

R&D Magazine and the LABORATORY DESIGN NEWSLETTER Webcast Series

Reducing Environmental Impact and Energy Consumption for Greener Laboratories

Sponsored by: **SIEMENS**

VIEW FREE TODAY

[Related Stories](#)

[Most Popular](#)

Histones, the first proteins to be purified, have been a topic of research by scientists for nearly 125 years. The mystery evolved as scientists discovered that cells have multiple copies of histone genes and make far more histones than what is needed for wrapping DNA, yet were unable to explain the apparent contradiction.

"On the one hand, you cannot find the excess histones," Gunjan said. "On the other hand, if you propose it gets degraded, then you try to measure its rate of degradation and you find that it hangs around for several months to more than a year."

Gunjan spent five years seeking answers to the mystery before his discovery of two separate pools of histones.

"Not only did we show for the first time that histones are unstable -- they get rapidly degraded -- we also showed this has important consequences for DNA damage and repair processes that have a major impact on cancer formation," Gunjan said.

Additionally, previous studies published by other researchers suggest that the newly discovered regulated histone proteolysis may make significant contributions to many diverse biological processes, from the resetting of epigenetic marks on histones that help regulate gene expression, to sperm formation.

"All of this together suggests this is a very important phenomenon," Gunjan said.

SOURCE

JOIN THE DISCUSSION

Rate Article: ☆☆☆☆☆ Average 0 out of 5

[Register](#) or [log in](#) to comment on this article!

0 COMMENTS

ADD COMMENT

Text Only 2000 character limit

Page 1 of 1

New To Market [more](#)

World's smoothest diamond hits the market

22 hours ago

Advanced Diamond Technologies, Inc. has announced the introduction of UNCD Horizon, the world's smoothest vapor-deposited diamond, to its family of award-winning diamond products. UNCD Horizon represents a generational leap in diamond wafer technology that brings the surface roughness of diamond films to levels comparable to electronic grade silicon wafers; opening up new vistas for the application of diamond into a wide variety of electronic and biomedical devices.

ASafeDrive keeps drivers within their limits

Sep 25

ASafeDrive, LLC released a highly-innovative mobile platform device—ASafeDrive. The new technology, now available for \$0.99 at the Apple App. Store within iTunes or at www.asafedrive.com, specifically aims to help commuters maintain vehicle speeds within legal limits throughout the Los Angeles area and across the United States.

Tools & Technology [more](#)

Industrial air velocity indicator

8 hours ago

The new FMA1000 series is designed and manufactured by Omega. This product measures and displays air velocity & air temperature of air flows in ducts, pipes. This product is used in HVAC applications, research labs, and other manufacturing processes.

Expandable spreader beam

8 hours ago

Walker Magnetics introduced ExBeam, an expandable spreader beam. ExBeam is designed to make the handling of long, unwieldy products both safer and easier. And, in the case of ExBeam, it's not limited to handling steel. ExBeam can also be used with slings and chains to handle other difficult loads such as logs or rolls of paper.

Establishing standard definitions for genome sequences

33 minutes ago | News

No scientific link between childhood vaccines and autism

1 hour ago | News

Scientists take step toward simple and portable tuberculosis tests for developing world

1 hour ago | News

Novartis buys rights to next-generation antibiotic

1 hour ago | News

Radiation costs vary widely by delivery, U-M study finds

2 hours ago | News

[Magazine/ Newsletters](#)

[Customer Service](#)

[Digital Issue](#)

[New Stem Cell Treatment](#)
High standard German clinic treats degenerative diseases. Request info www.xcell-center.com/StemCells

[Stem Cell Transplantation](#)
Get answers to your questions. Chat w/ cancer treatment experts today. CancerCenter.com

[Pharmaceutical Processing](#)
[Laboratory Equipment](#)
[Scientific Computing](#)
[Lab Design News](#)

[Terms & Conditions](#)

 [RSS Feeds](#)

 [Mobile](#)

 [Podcasts](#)

 [Blogs](#)