

Researcher unwinds discovery of proteins that enclose DNA

Parth Desai • Staff Writer • October 15, 2009

[Print this page](#) [Facebook](#)

Florida State University College of Medicine researcher Akash Gunjan discovered the existence of two separate pools of histones, a type of proteins that package DNA inside the nucleus of cells and help to regulate gene expression. Prior to his findings, scientific evidence did not account for the two levels of histones.

ADVERTISEMENT

60% of FSU students had four or fewer drinks the last time they partied. How do we know? You told us.

According to Gunjan's findings, one pool of histones package DNA and are highly stable with half-lives that extend upward of a year. Cells generate a surplus of the other pool of histones to make sure that histones will be readily available to package the DNA. These histones degrade rapidly, akin to other proteins.

Although Gunjan used *Saccharomyces cerevisiae* (a species of budding yeast) for the study, his findings are directly relevant to human cells.

"We can take a yeast histone and stick it in a human cell, and it functions exactly the same way as a human histone would do in a yeast cell," said Gunjan. "If you look at the amino acid sequences of Histone H4 between human cells and yeast cells, you probably find very little difference."

The findings, which were published in the July edition of the journal *Nature Cell Biology*, could lead to a host of applications related to DNA and gene expression in the future.

"The most gratifying part is that now we have enough information to start looking for similar pathways in human cells, especially in human cancers," said Gunjan. "(We can) see if that pathway has been affected in some (of) the known kinds of human cancers, because the main protein we identified in yeast that regulates the histone protein levels is a known tumor-suppressor protein in human cells."

In an unpublished study, Gunjan found that when there are more histones, cells are more prone to DNA damage. But, if the histone levels are too low for chromatin assembly, cells are terminated. This trend occurs because DNA is highly negative and histones are highly positive. When there is an excess of histones, they wrap around the DNA improperly and degrade the quality of the structure, making it inaccessible for essential proteins, such as transcription factors and DNA repair factors. In the future, researchers could apply the correlation of histone level and DNA damage vulnerability to cancer treatment.

"Since cancer cells are rapidly dividing cells, and histones are mainly expressed in rapidly dividing cells, that's a prime way of sensitizing a specific population of dividing cells to a chemotherapeutic agent and making it much more potent at lower doses," said Gunjan. "So now, if you want to induce histone synthesis to a high level in those cells, you can add a low dose of chemotherapeutic drugs to achieve the same level of cell killing — tumor cell killing — as you would have required previously."

For years, scientists have toiled over the finding that cells have more than one copy of histone genes and generate histones in excess quantities.

Related news from the Web

- [Biology](#)
- [Science](#)
- [Cell Biology](#)

Powered by [Topix.net](#)

ADVERTISEMENT

Just tell us "What is the best part of wakin' up at home during the holidays?" and you could win!
Enter Today

More FSU News headlines

- [Ghost tours reveal spooky secrets](#)
- [Center stage](#)
- [Born to be 'Wild'](#)
- [Spotlight on: Jordana Price](#)
- [Climbing uphill](#)

Latest Local News

- [House fire claims two lives in Alligator Point](#)
- [FSU-N.C. State game scheduled for noon on Halloween](#)
- [Homecoming promoter at FAMU arrested after trying to confront student](#)
- [Free tutoring program a hit at Florida State](#)
- [Gadsden County gang members convicted of racketeering](#)

Events

Monday, October 19 Print

[Showing events after 10/19.](#)
[Look for earlier events](#)

Saturday, October 31

Halloween

Sunday, November 1

Daylight Saving Time Ends

Tuesday, November 3

Election Day

...

