Abstractions

FIRST AUTHOR

Hot Jupiters are a class of giant extrasolar planet that reach very high temperatures owing to their close orbits about their stars. Theoretical models of hot Jupiters predict that water vapour should be abundant in their atmospheres. Surprisingly, Carl Grillmair, an astrophysicist at the Spitzer Science Center in Pasadena, California, and his colleagues found no water in the atmosphere of HD 189733b, an extrasolar planet 63 light years from Earth, when they used NASA's Spitzer Space Telescope to measure the planet's emission spectrum two years ago. On page 767, Grillmair's team present, from additional Spitzer data, the highest quality emission spectrum of an extrasolar planet so far. This enabled them to detect the predicted water absorption signature. Grillmair tells *Nature* more.

Was Spitzer designed to monitor extrasolar planets?

No. It was designed to explore a range of other objects. It happened to be launched around the time of an explosion of extrasolar-planet discoveries. With its infrared detectors, Spitzer is uniquely equipped to measure the atmospheres of extrasolar planets.

Did the initial results further your interest in this planet?

It was a bit disturbing to find no evidence of the water that atmospheric specialists were convinced should be there. Having published the initial results, we submitted a proposal to make more extensive spectral measurements. After monitoring 10 separate orbits of the planet, we now have the highest signal-to-noise ratio spectrum currently achievable.

Why did you miss the water initially?

Even after reanalysing the original data we still don't know. Unfortunately we can't directly compare our data sets because in the latest work we increased the exposure times to get better sampling. However, other data suggest that changes in the weather on these planets may occur on a global scale, which could explain the differences between our measurements.

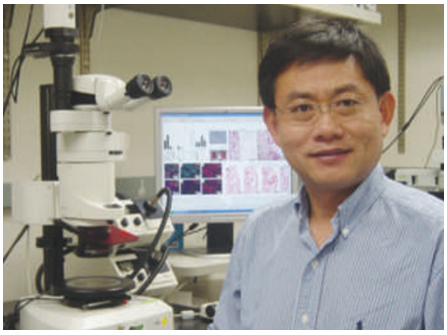
Do the data shed light on HD 189733b's atmospheric conditions?

Yes. Theoreticians expect these kinds of planet, which have the same side always facing their star, to be covered with rapidly changing, intense storms able to transport huge amounts of energy. Our data show that energy transport from the dayside to the nightside is weak. However, other data suggest much stronger energy transport. Reconciling this inconsistency might provide clues to what's happening in the deeper atmospheric layers. ■

MAKING THE PAPER

Wei-Qiang Gao

Search for prostate-cancer target identifies stem-cell population.



The cancer-stem-cell theory holds that tumours are formed by a very small population of self-renewing cells. The idea is controversial, but developmental biologist Wei-Qiang Gao hasn't allowed that to hamper his lab's quest to find such cells in the prostate. He and his colleagues have achieved an important first step — identifying the normal adult stem cells responsible for generating prostate tissue in mice.

According to the popular cancer-stem-cell hypothesis, tumours are derived from previously normal stem cells that have accumulated mutations. And because, like normal stem cells, these cancer stem cells are long-lived and slow growing, they are not killed off by treatments that target rapidly dividing, non-stem cancer cells. Much has been written about the model, says Gao, a senior scientist at Genentech in South San Francisco, California, but conclusive evidence that such cells exist has been lacking.

"Our main interest is in identifying human-prostate-cancer stem cells," explains Gao. But before he and his co-workers could do that, they needed to identify and characterize the normal prostate stem cells (PSCs) from which cancer stem cells — if they exist — might be derived.

Although three cell-surface proteins common to candidate PSCs had already been identified, they weren't specific enough to isolate only potential PSCs. Gao's group identified a fourth marker, CD117, that is specific to these cells by looking at a region of the prostate thought to be the stem-cell niche. Combined, the four markers form a PSC 'barcode' that can be used to sort out cells from prostate tissue. When these cells were transplanted into immunocompromised mice that would not reject them, the cells could generate prostate tissue that had the proper morphology and secreted prostate-specific proteins (see page 804).

But for a cell to be defined as a tissue stem cell, it must be able to give rise to all of the cell types within that tissue on its own. So the researchers repeated the transplant experiments with single cells from the barcode group. Individually, these cells were able to generate prostates.

"Scientifically, it is important to show whether such a stem cell exists within an organ. We show that conclusively," says Gao. But, he adds, "regenerating the prostate might have limited application for patients", considering that it is not a vital organ, it is not crucial to reproduction, and it can cause problems later in life — by, for example, becoming enlarged or cancerous.

Gao says that the project was driven largely by postdoc Kevin Leong. "Scientists at Genentech have the freedom to pursue basic-research questions because management believes it will eventually lead to innovation and exciting products," says Gao, who has worked for the company for almost 16 years. In this case, the work resulted in identifying CD117 as a likely marker for human PSCs as well — which might be of help in the effort to differentiate and target prostate cancer stem cells.

Gao says that even if cancer stem cells turn out not to exist, cells will be identified that perhaps go by another name — such as 'cancer-initiating cells', 'chemotherapy-resistant cells' or 'more metastatic cells'. "Whether or not the cancer-stem-cell model is correct, tumour masses seem to be heterogeneous and traditional therapies will probably not be able to kill all tumour cells," says Gao. "A therapy that specifically targets these subpopulations of cells is needed for more effective cancer treatment." ■

FROM THE BLOGOSPHERE

Fantastic stem-cell work was presented at a press conference at the lively Society for Neuroscience meeting — but from the lacklustre Q-and-A session afterwards, you'd never know it, writes *Nature* reporter Alison Abbott at In the Field (http://tinyurl.com/5ja5rl).

At the November meeting in Washington DC, stem-cell researchers described work on repairing irreversible inner-ear damage; conversion of frog pluripotent cells into retinal cells that could form functioning tadpole eyes; and intriguing latent stem cells in mice that might aid treatment of neurodegenerative diseases.

The authors of these studies were not only over-keen to avoid any semblance of hype, but also declined to comment to journalists on broader issues about US politics of embryonic-stem-cell research, or why there is so much low-quality adult-stem-cell research already being brought into the clinic.

Abbott remarks that it is very hard for journalists to decide how to react to and report new findings in adult-stem-cell research: "There is so much that is good, so much that is trivial, and not a clear enough signal from those in the field of where the difference lies." ■

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