NEWS

222 NIH grants: 22 researchers

A whopping 200 scientists received six or more grants each from the US National Institutes of Health (NIH) in 2007, according to data analysed by *Nature*. One principal investigator was awarded 32 grants, the data reveal, and many others got eight or nine.

The amounts awarded to some of these grandee grantees held some surprises too. Robert Sherwin of Yale University in Connecticut received eight grants totalling US$14.5 million last year for his research into diabetes; Harold Varmus, president of the Memorial Sloan-Kettering Cancer Center, New York, received grants of $13 million for work on cancer; and cell-death researcher John Reed of the California-based Burnham Institute for Medical Research received nearly $11 million in 11 grants.

The data that *Nature* analysed include all types of NIH grant, including supplemental grants and small grants awarded to organize conferences or run training workshops. Closer inspection reveals that some researchers received a wealth of grants for precisely these reasons — Andrew Robertson, the recipient of the 32 grants, is a conference organizer for Keystone Symposia, which necessarily requires him to juggle multiple projects. His grants average out at $15,300 each. But the multiple grants supporting some other investigators are not as immediately explicable.

Last month, advisory panels reviewing the NIH peer-review system recommended that researchers should devote at least 20% of their time to any project awarded a research grant (see *Nature* **451,** 1035; 2008). This would limit the number of grants awarded per investigator to five. "Are you really able to sustain the research if you have five or ten grants?" asked NIH director Elias Zerhouni after a congressional hearing on 5 March. "If you are going to be a principal investigator on a grant, you have to give the time." Zerhouni told *Nature* he wants to place a limit on the number of grants that researchers can get each year.

"The absolute number of grants is misleading," says Sten Vermund, director of the Institute for Global Health at Vanderbilt University Medical Center in Tennessee. He received 11 grants worth $24 million in 2007, but most of that was a single $19-million grant to manage a global HIV-prevention trial involving hundreds of researchers working on four continents at dozens of institutions. Seven of his grants were smaller and all essentially awarded for the same thing: an international AIDS training programme. Vermund acknowledges that a former stint at the NIH overseeing a $50-million grant portfolio in AIDS vaccine trials taught him a lot about how successful grant applications are packaged and marketed. "I don't want to make myself sound like a grant-writing technician, but let's be honest: that is a nontrivial part of success in biomedical research."

Other researchers seem to run 'labs-on-steroids', earning multiple grants through the sheer volume and quality of their work (see 'Day in the life of an 11-grant grandee'). They argue that if they're willing to work longer and harder — and still produce top research — then so be it. "Different people can achieve different things in 20% of their time. You should always reward the best science," says David Rawlings, the 51-year-old director of the Research Center for Immunity and Immunotherapies at the University of Washington in Seattle. He was supported last year by nine NIH grants worth $3 million.

Joann Boughman, executive vice-president of the American Society of Human Genetics, says that the NIH needs to keep young researchers working in independent situations so that they can have 'eureka' moments. At the same time, she says, the agency needs to support established laboratories that produce streams of rich data, often leading to new experiments — and new grants. "The question is, do the rich get richer while the poor get poorer?" she asks.

The reality is that grantees like Vermund inhabit a different world from the vast majority of biomedical scientists. Frozen funding at the NIH is creating an environment of "anxiety and fear" where talented young researchers repeatedly have their grant proposals rejected.

Zerhouni says that the inequities between the haves and have-nots were caused by a doubling of NIH funding between 1998 and 2003. As funding levels rose, many new PhD positions were created. Established investigators, using data produced by the new PhDs, were able to submit better grant proposals. But hordes of these grant-hungry PhDs were left standing when NIH funding flattened out after 2003. The agency now funds significantly more people over the age of 70 than under the age of 30. "We're eating our seedcorn," says Zerhouni.

Changes to the NIH peer-review system will be unveiled in mid-April. ■

Eric Hand with additional reporting by Meredith Wadman

SCIENTISTS SUPPORTED BY EIGHT OR MORE NIH GRANTS IN 2007

Principal investigator	Institution	Research type	Number of grants	Total value (US$1,000)
Andrew Robertson	Keystone Symposia	Conference organizer	32	490
Terri Grodzicker	Cold Spring Harbor Laboratory	Conference organizer	16	869
Sten Vermund	Family Health International	HIV-prevention trials	11	24,132
John Reed	Burnham Institute for Medical Research	Cell death	11	10,868
Jeffrey Murray	University of Iowa	Birth defects	11	7,060
Joseph McCune	University of California, San Francisco	Translational science	9	25,396
Bert O'Malley	Baylor College of Medicine	Reproductive biology	9	8,229
David Rawlings	Children's Hospital, Seattle	Gene therapy	9	3,000
David Allison	University of Alabama at Birmingham	Obesity	9	2,499
David Stewart	Cold Spring Harbor Laboratory	Conference organizer	9	255
Robert Sherwin	Yale University	Diabetes	8	14,550
Harold Varmus	Memorial Sloan-Kettering Cancer Center	Cancer	8	13,119
Pamela Davis	Case Western Reserve University	Cystic fibrosis	8	12,518
Bruce Rosen	Massachusetts General Hospital	Brain imaging	8	9,063
John Tainer	Scripps Research Institute	DNA biochemistry	8	5,375
Eric Nestler	University of Texas Southwestern Medical Center	Drug abuse	8	5,147
Jennifer Grandis	University of Pittsburgh	Head and neck cancer	8	3,702
Richard Chaisson	Johns Hopkins University	HIV, tuberculosis	8	3,277
William Petri	University of Virginia	Intestinal parasites	8	2,993
Joseph Vinetz	University of California, San Diego	Infectious diseases	8	2,758
Victor Garcia-Martinez	University of Texas Southwestern Medical Center	HIV transmission	8	2,463
Cun-Yu Wang	University of California, Los Angeles	Cancer	8	1,671

Day in the life of an 11-grant grandee

John Reed's workday begins when he wakes up at 3 a.m. to write grants and papers. At 6 or 6:30, he goes for a long run, swim or bicycle ride. By his own count, he has run 20 half-marathons and 10 marathons. Now aged 49, he's into half-triathlons — but only because full triathlons take too much training time.

By 7:30, Reed is at work at the Burnham Institute for Medical Research in La Jolla, California, juggling roles as its president and director of a 35-person lab that specializes in cell death. If his researchers need him urgently, they e-mail a secret address that goes directly to him. They each have weekly goals that must be met, and progress is measured with project-management software. "It's a no-nonsense, get-the-job-done, focused environment," Reed says.

On many evenings he has business dinners and meetings to attend. Every other evening, he goes home to spend time with his family. At weekends, he sleeps in — until 4:30 a.m.

Kenneth Yip, a 28-year-old postdoctoral researcher from Canada, joined the lab two years ago knowing that working with Reed would help him to build an attractive CV. "I don't know many principal investigators at that level who have washboard abs," Yip says. "He does everything 100% — which is 200% for the rest of us."

Reed's results speak for themselves. Between 1995 and 2005, he was the most highly cited author in all of cell biology, with 23,729 citations, according to Thomson's ESI ranking. His lab has averaged one paper per person per year.

His productivity has been rewarded with support from the US National Institutes of Health (NIH). In 2007, he received 11 NIH grants worth almost $11 million. He says he deserves them all. And he doesn't support a cap to the number of grants permitted per researcher. "The evidence is that some labs and some people can handle a larger portfolio," Reed says. "I don't think we should apply a one-size-fits-all mentality." **E.H.**

The Solar System's first breath

HOUSTON, TEXAS

Scientists have made the crucial measurement of oxygen composition at the birth of the Solar System. The discovery fulfils the top science priority of the NASA Genesis probe, which slammed into the Utah desert in 2004 on its return to Earth when its parachute failed to open.

"Despite crashing, all the major science objectives of Genesis will be met," says Kevin McKeegan, a cosmochemist at the University of California, Los Angeles. He announced the finding on 10 March at the Lunar and Planetary Science Conference in Houston, Texas.

The finding that the Sun is relatively richer than Earth in oxygen-16, the most common oxygen isotope, contradicts the conventional wisdom that Earth has the same oxygen isotope composition as the Sun. The discovery also gives researchers a reference point for the oxygen composition at the origin of the Solar System. Genesis trapped the stream of ionized particles known as the solar wind — which, because it emanates from the relatively unchanged outer layers of the Sun, is thought to carry primordial oxygen among its elements.

Oxygen-16, with eight protons and eight neutrons, comprises 99.8% of the oxygen on Earth. There are smaller amounts of oxygen-17 and oxygen-18, whose proportions vary throughout the Solar System. Scientists have measured slightly different proportions on Earth, Mars, the Moon and in meteorites, as if each place has its own oxygen fingerprint. "We had a map for oxygen isotopes," says McKeegan. "But we didn't know which way was up."

Researchers have gone to great lengths to try to discover the original proportion of oxygen isotopes in the Sun. Two rival groups published contradictory results from analyses of lunar soils, which are thought to contain embedded solar oxygen as the Moon lacks an atmospheric shield against the solar wind (see *Nature* **440**, 751–752; 2006). One of those researchers, Marc Chaussidon, is pleased that the new findings could settle the debate.

"There has been this question for years," says Chaussidon, a cosmochemist at the Research Centre for Petrochemistry and Geochemistry in Nancy, France. "Everybody would have bet that the Sun had the same composition as Earth and the meteorites. In fact, Earth is not like the Sun."

The result represents a triumph for the Genesis scientists, who have salvaged what they could from the wreck, including isotopic analyses of noble gases (A. Meshik *et al. Science* 318, 433–435; 2007). But oxygen is tougher to measure, as it is so plentiful and reactive. McKeegan and his group used a mass spectrometer on a 3-millimetre-square section of a silicon wafer containing oxygen from the solar wind.

Using a beam of caesium ions, the researchers eroded the top 20 nanometres of the sample to remove any contamination by Earth-based oxygen. Then, in a vacuum, they measured the isotopic composition of the Sun's oxygen, using the ion beam to knock the atoms loose from the silicon trap, and found a greater proportion of oxygen-16 than on Earth.

The result raises more questions, says Chaussidon. Now, scientists need to understand why Earth's oxygen composition is different from the Sun's, and what chemical processes caused the change. Whatever the process, it would have sucked out oxygen-16 while the gas of the proto-Solar System condensed into solid grains that coalesced into the planets.

It would also have been one of the very first things to happen in the 4.5685-billion-year-old Solar System. Chaussidon says the mystery process would have stripped away the oxygen-16 within the system's first few million years of existence. ■

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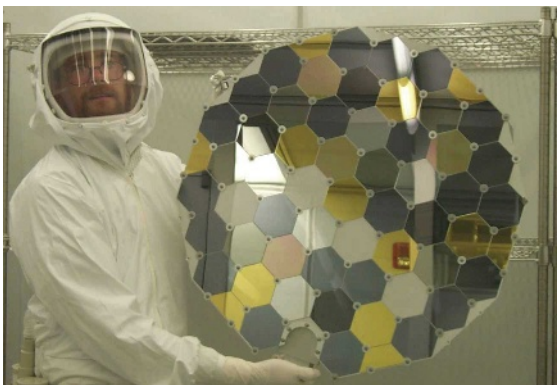

Genesis' collectors trapped atoms in the solar wind.