a modified gene to correct a type of liver disease. "That wakes me up at night," Loring admits.

If Takahashi's trial succeeds, however, it could send a powerful signal to other regulatory agencies such as the FDA and the European Medicines Agency. "If Masayo can demonstrate that these cells are safe in patients, that will have calmed some of the anxiety about the new cell type out there," says developmental molecular biologist Kapil Bharti at the National Eye Institute in Bethesda, Maryland. Bharti is leading an effort within the US National Institutes of Health (NIH) to develop an iPS-cell therapy for macular degeneration using an approach similar to Takahashi's. He hopes to apply to the FDA in 2017 to begin clinical trials.

"They are sort of envious because you can move forward rapidly in Japan."

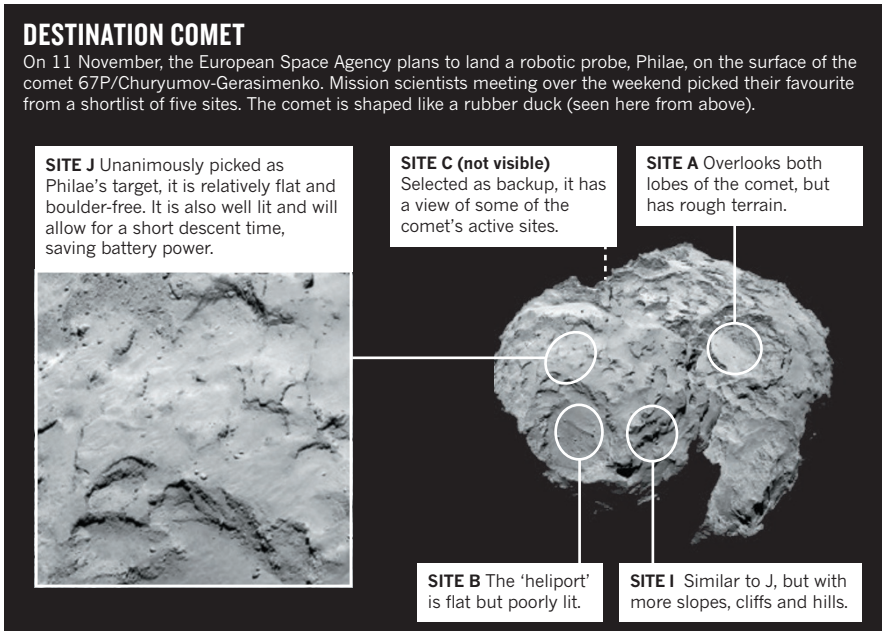
Others are less patient. Stem-cell biologist Mahendra Rao, who until recently headed the NIH Center for Regenerative Medicine that backs Bharti's trial and is now at the New York Stem Cell Foundation, says that regulations have been moving too slowly for companies outside Japan that want to do similar trials. One of these is Q Therapeutics in Salt Lake City, Utah, which he founded and which is developing cell-based therapies for neurodegenerative diseases. "They are sort of envious because you can move forward rapidly in Japan," he says.

But the Japanese system is also controversial. Since approving the Takahashi study, regulators, keen to stay ahead in stem-cell research, have changed the law to make it easier to test therapies based on iPS cells clinically, a move that some say could result in ineffective treatments being thrust on desperate patients.

The surgery offers some welcome positive news for RIKEN, and Japan, in the wake of a stem-cell scandal and tragedy. "It gives them some of the credibility back," Loring says.

Earlier this year, researchers from RIKEN's CDB published two papers in *Nature* claiming to have made stem cells through a technique known as stimulus-triggered acquisition of pluripotency, or STAP. The papers were retracted in July, leading to a misconduct charge for one researcher, and contributing to the suicide of another. The CDB is now being halved in size, but in 2016, RIKEN is planning to open the ¥3-billion (US$28-million) Kobe Eye Center to develop cutting-edge procedures such as Takahashi's. And the nation's new legislation means that several other Japanese researchers are expected to begin clinical iPS-cell studies soon, including Takahashi's husband, Kyoto University's Jun Takahashi, who is planning a trial for Parkinson's disease.

Outside Japan, many researchers hope that Masayo Takahashi's trial will hasten the translation of their own work to therapies. "Every time someone goes down this path, it is easier for those who are following," Loring says. ■



ESA/ROSETTA/MPS FOR OSIRIS TEAM MPS/UPD/LAM/IAA/SSO/INTA/UPM/DASP/IDA

SPACE

Lander to aim for comet's 'head'

Touchdown site for Rosetta probe chosen unanimously.

BY ELIZABETH GIBNEY

There is no easy way to alight on a 4-kilometre-long, rubber-duck-shaped ice ball that is spinning as it flies through the outer Solar System. But scientists working on the European Space Agency's Rosetta mission have selected a spot on the 'head' of the comet, called 67P/Churyumov-Gerasimenko, that they think will give them the best chance for gently landing Philae, a washing-machine-sized robotic probe.

Planned for 11 November, the first soft landing ever attempted on a comet is fraught with risk. When researchers still thought that the object had a regular, potato-like shape, they estimated the landing's chance of success at 70–75%. Now that the Rosetta orbiter has taken a closer look and revealed the curious shape, the odds are lower. Mark McCaughrean, a senior science adviser at the European Space Agency (ESA) directorate of science and robotic exploration in Noordwijk, the Netherlands, puts them at roughly "fifty–fifty".

The mission scientists were unanimous in their choice of landing spot — a 1-square-kilometre patch known as site J — from a shortlist of five (see 'Destination comet'). Philae lead scientist Jean-Pierre Bibring of the University of Paris-South in Orsay says that site J emerged as the favourite after the first day of a meeting held on the weekend of 13–14 September at the French National Centre for Space Studies in Toulouse. "This site is not the best for every one of the technical and scientific criteria, but overall it's by far the best for mission success," he says.

In a precisely choreographed fly-by, Rosetta will release Philae from a distance of about 10 kilometres. From there, the probe will drift unguided towards the target, where it will secure itself with harpoons and screws and start work. The information that Philae collects about the comet's innards will help to calibrate data gathered by the more powerful instruments on Rosetta, says McCaughrean. "There are many things that we can only do on the surface," he says.

A major advantage of site J is that the drop from Rosetta will be relatively short, at just 7 hours. That means that Philae will have more battery power to run its instruments after landing, because it will take two days to recharge using its solar panels.

The region also has relatively few boulders that could capsize Philae on landing. Still,

nowhere is devoid of danger. "There is no one big Heathrow airport on the surface where you can say, 'No problem'," says McCaughrean.

Although chosen mainly for technical considerations, the site is also interesting scientifically. It is just a few hundred metres from two pits that scientists think will become more active, spewing out gas and dust, as the comet moves closer to the Sun and heats up. The position of the landing relative to Rosetta's orbit will also afford the best chance of transmitting radio waves between the two craft to map the comet's interior, says Bibring.

The mission team says that it reached its decision quickly, then spent most of the meeting's second day picking a backup — a spot on the comet's body known as site C.

Other potential backups included a crater nicknamed 'the heliport' for its flatness, but the site is not as well lit as site C. And a spot that would have provided views of the body, head and highly active 'neck' region had been effectively ruled out before the meeting even started, says Bibring, because Rosetta would have needed to drop to an orbit that was dangerously close to the comet.

The Rosetta team is rushing to gather as much data as possible and to stick to the November landing date, because after that increased comet activity could damage the orbiter.

Rosetta has been chasing its quarry for a decade. After waking from hibernation in January, it arrived at its destination in August and has been charting its target from ever-shrinking orbits ever since. Rosetta will continue to follow the comet as it journeys around the Sun. ■

POLICY

Climate summit previews push for new global treaty

United Nations meeting aims to spark enthusiasm for a 2015 emissions pact.

BY LAUREN MORELLO

When the United Nations Climate Summit begins on 23 September in New York City, US President Barack Obama will be there. But many of his counterparts from other major greenhouse-gas-emitting countries — including China, India, Germany and Australia — plan to stay at home. Still, the meeting could offer important clues to how a UN push to forge a new international climate pact by the end of 2015 will play out.

Approved in 1992 at the Earth Summit in Rio de Janeiro, the Kyoto Protocol is the only legally binding international treaty governing greenhouse-gas emissions. Parts of it expired at the end of 2012, and efforts have since been afoot to develop a new pact, as demanded by the 22-year-old United Nations Framework Convention on Climate Change (UNFCCC).

The New York meeting is not part of the formal process to shape a new international climate treaty. Instead, the gathering was conceived by UN secretary general Ban Ki-moon as a way of marshalling enthusiasm for the effort, which is set to conclude in Paris in December 2015; any agreement would take effect in 2020.

International climate negotiations have a long and chequered history. The Kyoto Protocol was never ratified by the United States, did not require rapidly developing countries to reduce their emissions and was rejected by Canada and Russia as the first round of emissions-reductions commitments expired in 2012.

In the meantime, the world's output of carbon dioxide and other heat-trapping gases has continued to rise. The level of CO_2 in the atmosphere reached 396 parts per million in 2013, 42% higher than pre-industrial levels. Last year's was the largest annual increase since 1984, according to figures reported on 9 September by the World Meteorological Organization in Geneva, Switzerland.

Climate negotiators face sticky questions as they work to craft a new agreement. Some are basic: will the Paris treaty be legally binding? Others are more complex and long-standing. Many developing nations, for instance, worry that carbon cuts will jeopardize their economic progress. The challenge is formidable, says Nicholas Stern, a climate-change economist at the London School of Economics. By 2030, Stern says, the world must reduce its greenhouse-gas emissions by roughly 20% from the current level to have a chance of limiting warming to 2 °C above pre-industrial temperatures, the UNFCCC's stated goal. Current emissions pledges put the world on track for a 3 °C warming by 2100, according to a 7 September report by PriceWaterhouseCoopers.

Yet climate-policy experts insist that there is reason for optimism heading into the New York meeting. "We need to stop judging climate action by whether we get a so-called legally binding treaty," says Paul Bledsoe, senior fellow at the German Marshall Fund in Washington DC and a White House climate-change official under former president Bill Clinton.

Bledsoe sees signs of meaningful progress by major emitters such as China. The country has enacted a cap-and-trade programme to reduce greenhouse-gas emissions in seven provinces and increased its investment in renewable energy. The world's leading greenhouse-gas emitter is also considering a ban on coal-fired electricity generation in the Beijing area to address air-quality concerns. The move would be an important step away from the form of power generation that produces the most greenhouse-gas emissions.

There are also signs of progress in the United States, the second-largest emitter of greenhouse gases, says David Waskow, director of the international climate project at the World Resources Institute in Washington DC. Obama is using his executive power to enact policies that reduce greenhouse gases — bypassing Congress, which has long stymied any plan for emissions reductions. Waskow points to Obama's proposal, unveiled in June, to cut greenhouse-gas emissions from existing power plants, which produce 38% of the country's total. The United States already regulates emissions from automobiles and is working to finalize limits for new power plants.

Last year's was the largest annual CO_2 increase since 1984.

Although India's prime minister, Narendra Modi, will not be attending, the stance of India's representatives to the New York summit could yield clues to the country's climate policy. Modi took office in May and championed renewable energy during more than a decade as chief minister of Gujarat state. "It's a new government, and they haven't had a lot of time to sink their teeth into this," says Jake Schmidt, director of the international climate programme at the Natural Resources Defense Council in Washington DC. "India is a big unknown."

But the true test of progress towards a new treaty will not come until March, when nations are required to submit their national greenhouse-gas reductions goals to the UNFCCC. "That is really the timeline to keep an eye on," says Waskow. ■