block research for which scientists collect data or biological samples such as blood and tissue under 'broad consent', whereby study participants agree that researchers can keep and analyse their samples for unspecified purposes. Some local scientists are lobbying the government for an exemption, saying that restrictions could hamper work on diseases such as HIV and tuberculosis.

Procedures during disease outbreaks are also controversial. Foreign medical workers and researchers who came to West Africa during the 2014–16 Ebola outbreak exported blood samples from some of the affected nations — sometimes without the donors' consent — to their home countries for quicker analysis. Despite attempts to recover these specimens, or to find out what happened to them, many samples remain in foreign laboratories, and it's unclear whether Africans will share in any benefits from the research, such as new treatments.

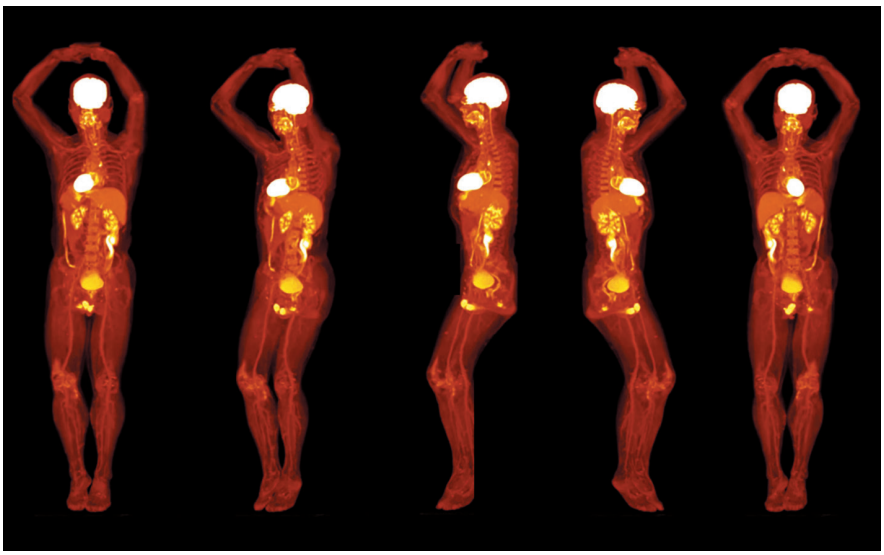
These issues are among many that the AAS committee might consider while drawing up its guidelines.

Even when data-sharing policies are negotiated as part of international partnerships, African scientists might feel unable to push back against the wishes of powerful donors or research partners. African scientists might not question unfair policies for fear of harming their funding chances — and instead simply accept the grants and their inequitable conditions, says an African researcher who didn't want to be named because of the sensitivities of the situation. This is especially problematic for younger researchers, the scientist says.

Clear national or institutional data-sharing policies could help scientists who find themselves in such a position, the AAS committee said. "By having these frameworks, researchers will become less vulnerable and be better able to engage with their donors to achieve mutual respect and benefit."

Whatever way the AAS committee guidelines address the practical challenges of data sharing, it's important that they also uphold African values, says Collet Dandara, a geneticist at the University of Cape Town in South Africa. Communities that take a group-centred approach to participation in research projects, such as the San people in southern Africa, can run into problems with the individualized approach to data ownership and benefit sharing that is common in Western science. Deciding how to proceed would involve working closely with communities that have some claim to the information being gathered, Dandara says, including asking members how they think the work should be done.

Some people say the communities wouldn't understand the research, Dandara says. "But if they don't understand, why are we researching them? Maybe it's us who don't understand." ■



UC DAVIS; ZHONGSHAN HOSPITAL; UNITED IMAGING HEALTHCARE

Images from the device can be used to study how drugs or infections move through the human body.

TECHNOLOGY

Whole-body scans made in seconds

A modified PET scanner requires less radiation exposure, vastly broadening its applications.

BY SARA REARDON

A medical imaging device that can create 3D renderings of the entire human body in as little as 20 seconds could soon be used for a wide variety of research and clinical applications.

The modified positron emission tomography (PET) scanner is faster than conventional PET scans — which can take an average of 20 minutes — and requires less radiation exposure for the person being imaged. Researchers presented video taken by the device at the US National Institutes of Health's High-Risk, High-Reward Research Symposium in Bethesda, Maryland, earlier this month.

The machine could be especially helpful for imaging children, who tend to wiggle around inside a scanner and ruin the measurements, as well as for studies of how drugs move through the body, says Sanjay Jain, a paediatrician and infectious-disease physician at Johns Hopkins University in Baltimore, Maryland.

Standard PET scanners detect γ-rays from radioactive tracers that doctors inject into the person being imaged. The person's cells take up the molecules, which release γ-rays, and break them down. A ring-shaped detector positioned around the person measures the angle and speed of the rays and reconstructs their origin, creating a 3D map of the cells that are metabolizing the molecule.

The ring is just 25 centimetres thick, however, so physicians can image only a small portion of the body at a time. Capturing larger areas requires them to dose the person with more of the radioactive molecule — it decays quickly, which means the signal fades fast — and move them back and forth through the ring.

"The whole-body machine is another quantum jump in medical imaging."

Biomedical engineer Ramsey Badawi and his colleagues at the University of California, Davis, solved this problem by connecting eight PET scanner rings into a 2-metre-long tube that can image the entire body at once. It creates a rendering in 1/40 of the time of a conventional scanner, using 1/40 of the radiation dose and so reducing the radiation risk. The researchers can also leave someone in the scanner for longer periods and take motion-capture images to follow a radioactive tracer through their body.

The US Food and Drug Administration approved the modified scanner for use in the United States last December, and Badawi plans to scan the first patients ▶

with it in California next month.

"The whole-body machine is another quantum jump in medical imaging," says Abass Alavi, a radiologist at the University of Pennsylvania in Philadelphia. He is collaborating with Badawi to use the modified PET scanner to study atherosclerosis, a condition in which plaque builds up in a person's arteries. Eventually, Alavi says, physicians might be able to use the device to see whether certain drugs help to treat the artery-clogging disease.

Conventional PET scanners aren't usually used for this purpose because of the cost and the radiation exposure to the person, says Badawi.

Jain is hoping to use the device to test a radioactive sugar tracer he's developed that's ingested by bacterial but not mammalian cells. Injecting the tracer into people suspected of having a bacterial infection could highlight where in the body the bacteria are concentrated. Jain's lab is also developing tracers that could distinguish between types of bacterium. ■

AGRICULTURE

China seeks predator to stop voracious caterpillar

Scientists scramble to find ways to halt the fall armyworm's march across the country.

BY ANDREW SILVER

A hungry caterpillar that ravages crops is advancing across China and threatening the nation's vast supply of maize. Scientists are investigating ways to minimize the damage caused by the invasive fall armyworm — which was first detected in China in January — including experimenting with native predators that could keep the pest in check. Some researchers say that the insect's spread might have been slowed if the country grew genetically modified food crops.

The fall armyworm (*Spodoptera frugiperda*), a native of Central and South America, has spread around the world in the past few years, causing devastation of crops in parts of Africa and southern Asia. Since its arrival in China, it has been found in 18 provinces, regions and municipalities, according to China's ministry of agriculture.

So far, damage caused by the caterpillar — mostly to maize (corn), but also to other crops such as sugar cane — in China is considered manageable. But Hu Gao, an entomologist at Nanjing Agricultural University who is monitoring the insect's spread, says researchers and farmers fear what will happen when the pest arrives, probably later this month, at the North China Plain. China is the world's second-largest producer of maize, and the northern plain produces almost 30% of the country's crop.

WALDO SWIEGERS/BLOOMBERG/GETTY

The invasive fall armyworm has laid waste to crop plants around the world.

HIGH COST

Recent outbreaks of fall armyworm in Africa and southern Asia have resulted in maize yield losses as high as 50%. In Africa, where the pest arrived in 2016, it costs 12 major maize-growing countries a total of between US$1 billion and $4 billion in lost crops a year (X.-J. Li *et al.* Preprint at bioRxiv http://doi.org/c7dc; 2019). China is also still battling an epidemic of a highly contagious virus affecting pigs, African swine fever, which has led to the culling of more than one million of the animals.

"The spread of fall armyworm in China will have a significant impact, along with the spread of swine fever, on Chinese consumers," says Cong Cao, a researcher studying innovation at the University of Nottingham Ningbo China. The rising price of food will put tremendous pressure on the government to control the pest, says Cao.

Hu says that plant-protection centres in provinces and cities are focused on monitoring and controlling the fall armyworm's spread. The adult moths, which are responsible for the pest's spread, can travel hundreds of kilometres over successive nights. Control measures include traps and pesticides.

Scientists, meanwhile, are working on other strategies. Hu says researchers at his and other Chinese universities are studying chemicals that could be used to attract the insect to traps, and native insects that could be deployed as a means of biological control.

A report by the US Department of Agriculture, released in May, on the fall armyworm's spread in China said that the insect has no natural predators in the country, but Hu disputes that conclusion.

China's parasitic Braconid wasps already kill other species in the *Spodoptera* genus to which the fall armyworm belongs, including the cotton leafworm (*Spodoptera litura*) and the beet armyworm (*Spodoptera exigua*), so Hu thinks the wasp could also target the fall armyworm caterpillar. In Africa, some parasitoids