European biosafety labs set to grow

Bioterrorism and emerging diseases spur building boom, although some question the need for more facilities.

Containing risk: a project to link up all of Europe's highest-security labs is being planned.

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A rash of new maximum-security biosafety-level-4 (BSL-4) labs are being built in the European Union (EU), and even more are planned, but some scientists are arguing that the bloc already has more facilities than it needs.

The issue is currently being tackled by a three-year study, costing €5 million (US$7.5 million), which looks set to determine the future of the European BSL-4 landscape. The study, funded by the European Commission, is the initial phase of a project called 'European research infrastructure on highly pathogenic agents' (ERINHA), which will bring all EU BSL-4 labs into a single network.

The project involves the main laboratories and national governments, and aims to work out a coherent scientific and policy case for future BSL-4 needs, thereby helping to avoid duplication, says Hervé Raoul, director of the Jean Meriéux-Inserm BSL-4 lab in Lyon, France, and coordinator of ERINHA. It would also introduce pan-European guidelines on best safety and security practices, and enable researchers from any member state to use facilities anywhere in the EU.

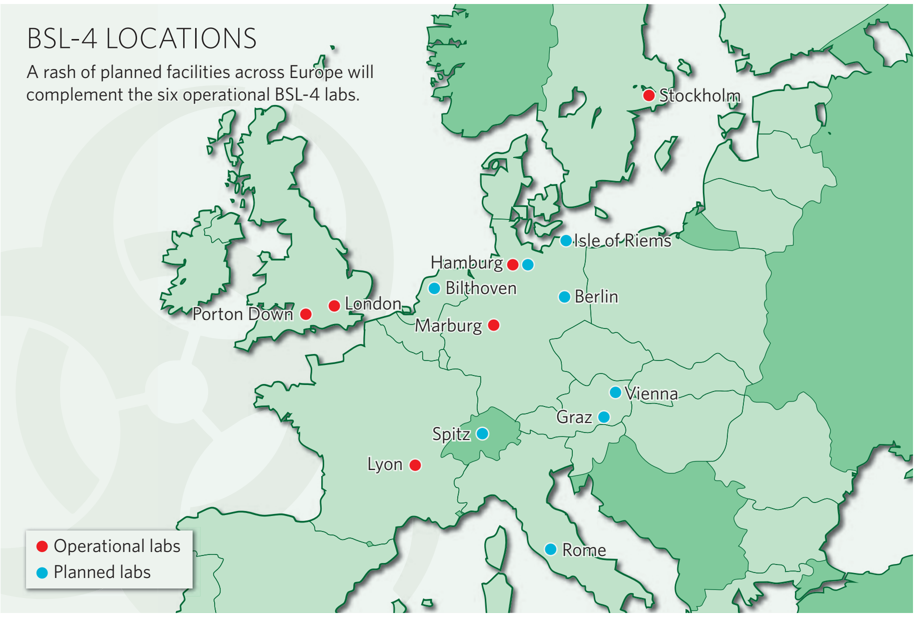
ERINHA is part of a broader EU initiative, the European Strategy Forum on Research Infrastructures (ESFRI), that was set up to improve the coordination of Europe's large research infrastructures (see *Nature* **450,** 586; 2007). It foresees costs of some €174 million for construction and upgrading of BSL-4 labs, and €24 million annually for operating expenses, with most funding coming from member states.

The EU currently has six operational BSL-4 labs in four countries — Britain, Germany, Sweden and France — with at least eight new facilities being built, or under discussion, in Italy, Germany, the Netherlands, Switzerland and Austria (see map), although the Italian facility will replace the existing one there. That expansion mirrors a similar boom in the United States, where new construction will increase the number of BSL-4 labs from 7 to 13 (see *Nature* **461,** 577; 2009).

Scientists contacted by *Nature* agree that there are benefits from greater collaboration between centres and from refurbishing older labs. Bringing the BSL-4 labs together in a network should also help to improve the response to health threats at a pan-European level, says Carla Nisii, a researcher at the National Institute of Infectious Diseases in Rome. The project also aims to build laboratories in Eastern Europe.

But some are sceptical about the need for more European facilities. "The existing facilities are already more than sufficient," says one high-security-lab researcher who requested anonymity. "I'm not so sure more infrastructure is necessary," agrees Stephan Günther, head of the Bernhard Nocht Institute for Tropical Medicine in Hamburg, Germany, which has a decades-old BSL-4 lab and is preparing to open the doors of a new one. Günther's lab specializes in research on exotic and dangerous viruses, as do most of the older BSL-4 labs in Europe.

Günther suggests that the current boom in BSL-4 labs has been largely prompted by heightened concerns over bioterrorism following the terrorist attacks of 11 September 2001. "Before 11 September there was no interest in



Risk ratings

BSL-1: For basic teaching or research use, handling organisms unlikely to cause disease.
BSL-2: For health and diagnostics services, handling pathogens that cause treatable diseases, such as rabies virus or the 2009 pandemic H1N1 flu virus. Researchers wear protective clothing and use biosafety cabinets.
BSL-3: For specialized diagnostics or research on pathogens that cause serious but not highly contagiousdiseases, such as SARS coronavirus. Sealed labs have negative air pressure and safety cabinets for all work.
BSL-4: Dangerous-pathogen units for research on exotic agents that causes serious and highly contagious diseases, such as Ebola virus. Lab entry via airlocks, exit via showers. Researchers work in glove-box safety cabinets with air-supplied positive-pressure 'spacesuits', and are in constant radio contact.

all these diseases; it was only tropical-health researchers who were interested in them," he says.

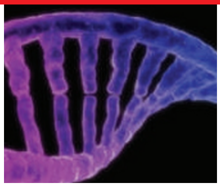
"Bioterrorism is taken into account, of course," says Raoul. But the primary motivation is to help the EU prepare for emerging diseases such as SARS. BSL-4 labs are a vital part of the standard response to an outbreak, responsible for isolating and characterizing the pathogen, developing diagnostic techniques and sometimes working on potential therapies. "We are seeing roughly one new emerging or re-emerging pathogen per year, while pathogens are also changing their geographical ranges, and travel is resulting in more imported cases of exotic diseases," says Philip Luton, a scientist who is now head of business development and spokesman at the UK Health Protection Agency's Centre for Emergency Preparedness and Response at the Porton Down military establishment near Salisbury.

Although Günther is sceptical about the need for more labs, he thinks that the ERINHA project would certainly help existing facilities to upgrade. Whereas national governments may fund the construction costs of BSL-4 labs, they are often unwilling to cover the running costs of such labs in the long term, he says, a problem that a pan-European network could help to address. The running costs of a BSL-4 lab are much higher than those of a typical virology lab, says Raoul. Maintenance of his own Lyon lab runs to €1.5 million annually, on top of €1 million in salaries for the core support staff who assist visiting researchers.

The best way to ensure sustained operational funding is to make a well-argued case at the European level and to get buy-in from national decision-makers, argues Raoul. "We are making it clear that to construct a BSL-4 lab without taking into account its subsequent running costs is suicidal."

Declan Butler

For more, see Editorial, page 137, and News Feature, page 154.



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Call to boost isotope supplies

The US Department of Energy should build two dedicated isotope-production facilities, costing about $65 million in total, to solve worsening supply problems for researchers in medicine, physical sciences and national security. That's the conclusion from a panel convened by the energy department's Nuclear Science Advisory Committee (NSAC), which approved the panel's report on the state of the US isotope programme on 5 November.

The programme supplies researchers with isotopes that are not readily available from commercial suppliers, and is tiny compared with the vast market for routinely used medical isotopes, such as technetium-99m — which itself is still beset with ongoing supply problems (see *Nature* 460, 312–313; 2009).

Despite the programme's small size — its 2008 budget was just $32 million — its products are essential to a wide array of research fields. But fragmented and ageing production facilities at the energy department have struggled to keep up with the variety and pace of demands. So last year the department commissioned the NSAC to identify the most important research isotopes and to come up with ways to alleviate supply fluctuations.

> "Other priorities can sometimes bump research-isotope production to the back of the line."

The committee concluded that a group of isotopes with potential for use in medical therapy were the most critical. These isotopes, including actinium-225, emit α-particles that have high energies but low velocities, which means that they are effective at killing tumours without damaging healthy tissue. But shortages are holding up clinical trials, says Roy Brown, who was an industry representative on the report and is director of federal affairs for the Council on Radionuclides and Radiopharmaceuticals, which represents US and Canadian isotope manufacturers. Other important medical isotopes include arsenic-76, used in palliative care for bone pain, and palladium-103, implanted as seeds into prostate glands to kill cancers.

But isotopes are used for more than just medicine. Physicists want californium-252 so they can split its heavy nucleus to make beams of smaller, rare isotopes, useful for frontier experiments in nuclear physics. NASA wants better supplies of plutonium-238 as a thermal heat source for long-lived planetary probes. And germanium-76 is needed for decay experiments that test whether neutrinos are their own anti-particles, which could help explain why the Universe is dominated by matter rather than anti-matter.

Isotopes used in national security often take precedence over other research needs — especially in the case of helium-3, which is being used in neutron detectors at ports to spot smuggled plutonium. But this has pushed up prices for researchers who want helium-3, used in many of the ultra-low-temperature refrigeration systems needed, for example, to study the super-cooled clouds of atoms known as Bose–Einstein condensates.

The report says that supplies of many of these isotopes could be much improved by building two new facilities. One would be a electromagnetic separator to enrich certain rare isotopes; the other would be an accelerator, which could collide different particles to create isotopes that are not found naturally. Donald Geesaman, a physicist at Argonne National Laboratory in Illinois who co-chaired the report committee, says that the separator could be built for $25 million and the accelerator might cost $40 million.

Research isotopes managed by the programme currently come from three places: accelerators at Brookhaven National Laboratory in Upton, New York, and Los Alamos National Laboratory in New Mexico, as well as from a nuclear reactor at Oak Ridge National Laboratory in Tennessee. But producing research isotopes is a secondary task for these facilities, and other priorities can sometimes bump isotope production to the back of the line, says Brown.

Jehanne Gillo, who directs the isotope programme for the energy department, says that the report comes too late to be included in the department's budget request for fiscal year 2011, but could be used to compete for money against other requirements in 2012.

Eric Hand