

Maximum security lab to tackle biothreats

Singapore will establish its first biosafety level 4 (BSL-4) lab by 2025 to handle unknown or highly dangerous pathogens. Biosafety labs are categorised based on the risk levels of viruses and bacteria which they are equipped to handle safely. Here are what the different risk levels mean and key features of the upcoming lab by DSO National Laboratories.

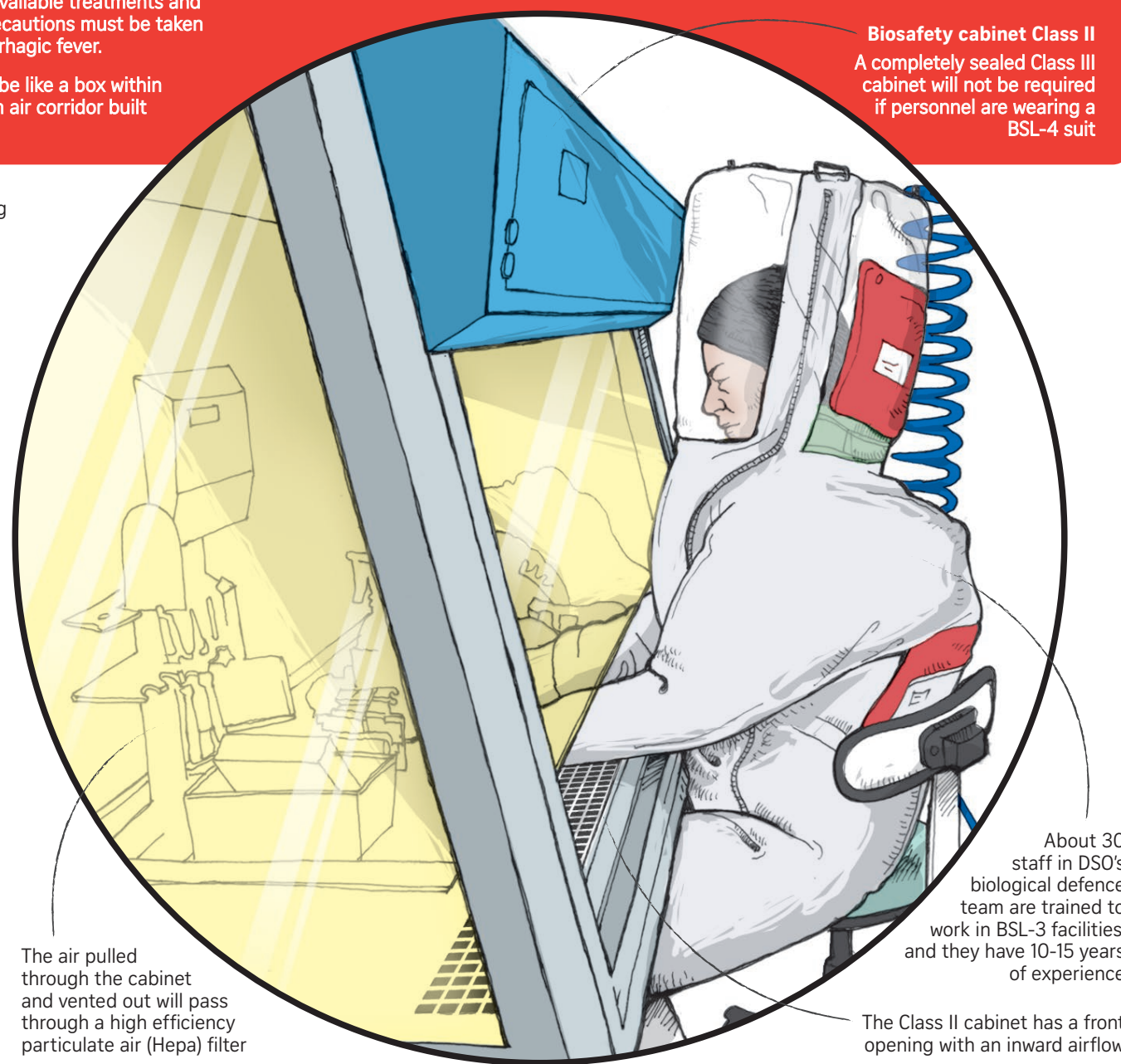
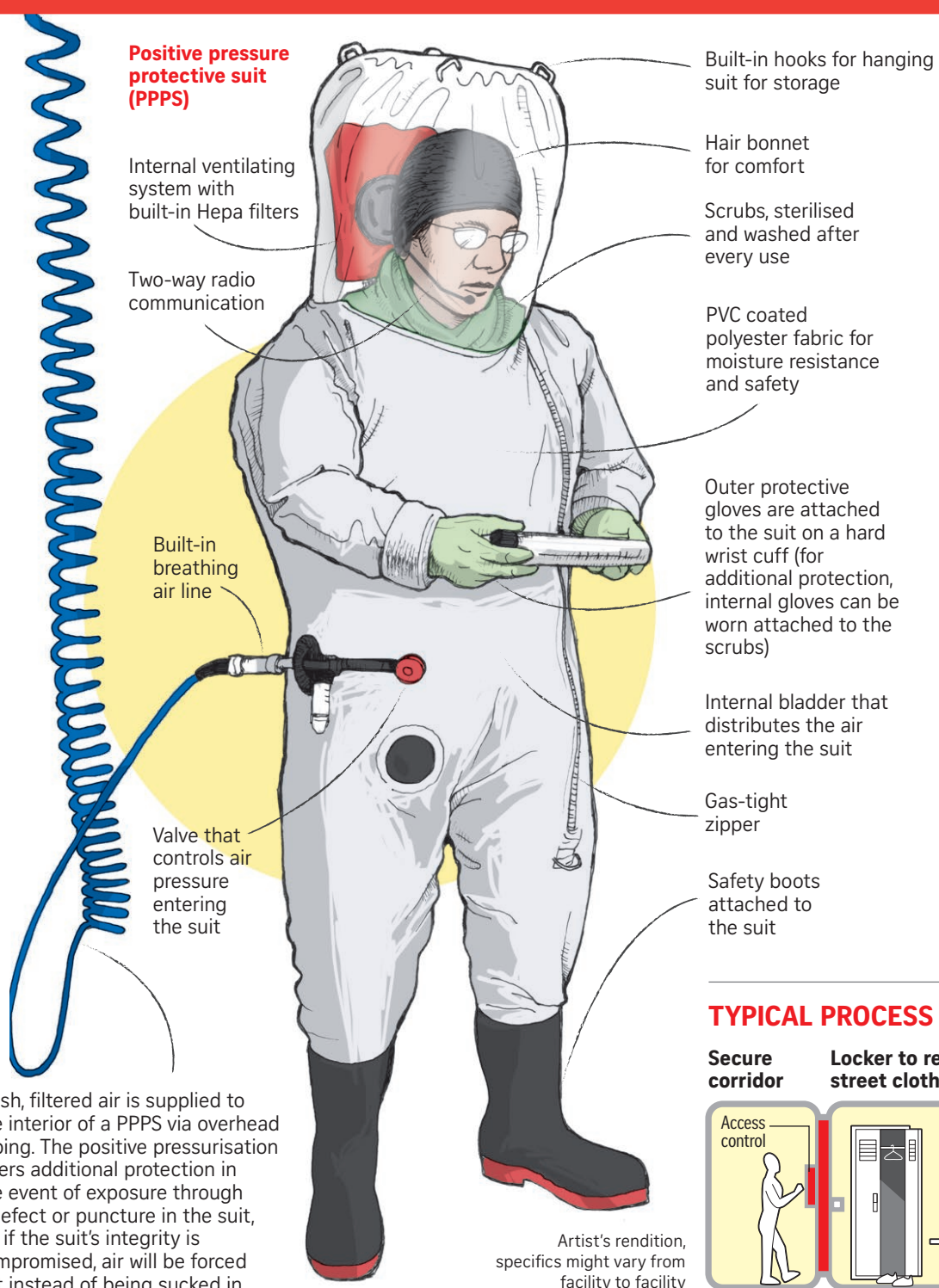
BSL-1 Biological agents in this group are not known to consistently make healthy adults sick. One example is E. coli. The level of precaution at this level is minimal, and a BSL-1 lab is not required to be isolated from surrounding facilities.

BSL-2 Biological agents at this level pose moderate hazards to lab personnel and the environment, and are associated with diseases of varying severity. They include salmonella, measles, human immunodeficiency virus, and dengue. All procedures that can cause infection from aerosols or splashes must be performed within a biosafety cabinet.

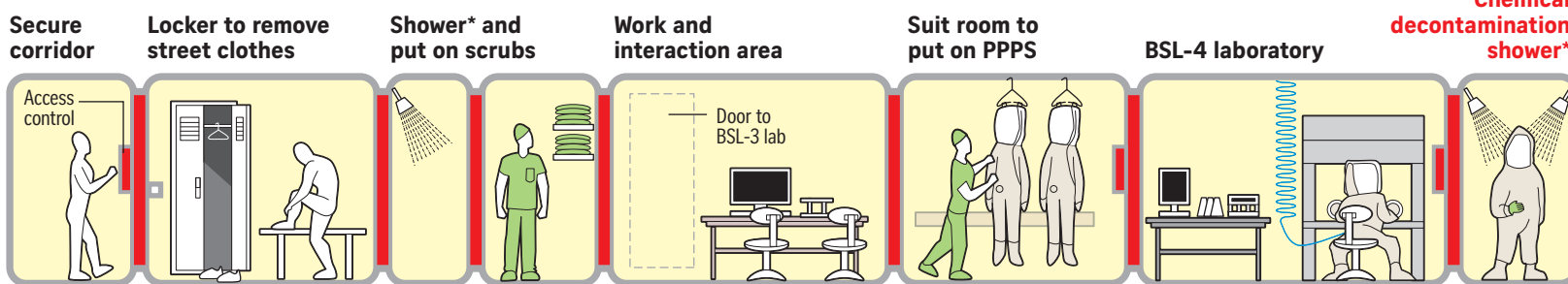
BSL-3 Biological agents here can cause serious or potentially lethal diseases through respiratory transmission. Examples include the bacteria or viruses that cause tuberculosis, severe acute respiratory syndrome and Covid-19. Access to a BSL-3 laboratory is restricted and controlled at all times.

BSL-4 Biological agents in this group can cause severe disease and death, usually with no available treatments and vaccines, and pose a high risk of being transmitted by aerosols. Extreme isolation precautions must be taken when handling agents such as Ebola, Marburg virus, Lassa fever, and Bolivian haemorrhagic fever.

- BSL-4 lab users wear a positive pressure protective suit (PPPS), which is like a spacesuit with its own air supply.
- The suit creates a protective bubble around the user, on top of the protection provided by a biosafety cabinet
- The lab will be like a box within a box, with an air corridor built around it.



TYPICAL PROCESS OF GETTING IN AND OUT OF A BSL-4 LAB



Fresh, filtered air is supplied to the interior of a PPPS via overhead tubing. The positive pressurisation offers additional protection in the event of exposure through a defect or puncture in the suit, for if the suit's integrity is compromised, air will be forced out instead of being sucked in.

*Mandatory to shower before exiting

Sources: CDC, NATIONAL INSTITUTE OF ALLERGY AND INFECTIOUS DISEASES STRAITS TIMES GRAPHICS: MIKE M DIZON, LIM MIN ZHANG