## Safe working with blood, bodily fluids and human tissue

All human blood, blood components, bodily fluids, solid tissue and aerosols from tissue are potentially infectious. People who work with human material are at risk of exposure to [blood-borne viruses](https://www.hse.gov.uk/pubns/indg342.pdf), but also infections from other pathogens depending on the type of tissue. For example, you may be exposed to respiratory pathogens if working with lung tissue. Cuts and punctures with contaminated sharps and splashes to mucous membranes such as the eye, nose or mouth must be considered as routes for accidental exposure.

Several factors should be taken into account when assessing the risks posed by blood, bodily fluids and human tissue. A summary of points to consider when assessing the risk:

|  |  |
| --- | --- |
| **Source of material** | * Do you know the characteristics of the source population which may impact the risk level; for example prevalence of infection, or if immunocompromised?
* Can you use pre-screened material to reduce to the risk?
* Have samples been taken during a particular stage of infection, for example when viral titres could be high?
 |
| **Risk of inadvertent cultivation**  | * Are you working with material that contains cells that support the cultivation of blood-borne pathogens, and if so will culture length allow replication to significant levels?
 |
| **Nature of your activity**  | * Will the work increase the likelihood of exposure e.g. through the use of sharps or by the generation of splashes or aerosols?
 |

## Containment and control measures

The majority of work with material that **could** contain [hazard group 3](https://www.hse.gov.uk/pubns/misc208.pdf) pathogens (such as HIV and Hepatitis B) can take place in a Containment level 2 laboratory, with additional controls. These controls aim to prevent: Skin penetrating injuries from sharps; contamination of skin and mucous membranes (eyes, nose and mouth); and contamination of working surfaces.

Where it is **known or strongly suspected** that hazard group 3 blood borne pathogens are present then material must be regarded as high risk and handled at a minimum in a derogated[[1]](#footnote-1) Containment Level 3 facility.

If hazard group 3 pathogens that may be present are to be **concentrated or propagated**, either intentionally or otherwise, full Containment Level 3 controls must be applied.

If samples are suspected or known to contain hazard group 2 pathogens only (such as Herpes simplex), these can be worked with at containment level 2 in all cases. However, the potential for infection must still be considered and contained equipment like safety cabinets used as required.

A summary of controls is given in the sections below.

## Screened\* blood, bodily fluids and human tissue, for example from the NHS Blood and Transplant Service.

Can be handled at containment level 2, with standard controls. These include:

1. Access restricted to authorised people only.
2. No eating, drinking, or applying cosmetics.
3. Use good basic hygiene practices, such as hand washing. Always wash hands before leaving the laboratory.
4. Consider the use of devices incorporating safety features, such as safer needle devices and blunt-ended scissors.
5. Control contamination of surfaces by containment and regular cleaning with disinfectants.
6. Dispose of contaminated waste safely; as either offensive or clinical waste.

## Unscreened blood, bodily fluids and human tissue; may contain pathogens.

Most material in this category can be handled at containment level 2, with the additional controls below:

1. Use safety cabinets and other contained equipment, if there is a risk of producing infectious droplets or aerosols.
2. Cover cuts or broken skin with waterproof dressings.
3. Wear gloves. Discard them before handling items likely to be used by others, e.g. phones.
4. Wear eye protection if there is a risk of splashing.
5. Avoid the use of sharps including glassware.
6. Work should be carried out in a designated area of the laboratory with sufficient space to work safely. The workspace should be kept clear of any unnecessary equipment.

**Exceptions to the above include:** Respiratory samples (nasopharyngeal or oropharyngeal swabs, bronchoalveolar lavage, aspirate samples, saliva and sputum), faecal samples, urine and amniotic fluid. For these types of samples, controls must be determined by first referring to [COVID-19 and SARS-CoV-2 guidance](https://www.ucl.ac.uk/safety-services/sites/safety-services/files/guidance_for_laboratory_work_with_sars-cov-2.docx).

## Blood, bodily fluids and human tissue known to contain hazard group 3 pathogens.

Must be handled at containment level 3. Some controls such as negative pressure may be derogated, subject to risk assessment.

\*Screening normally includes tests for Syphilis, HIV, HTLV, Hepatitis B, C and E. Donated blood is not screened for SARS-CoV-2 by the NHS.

## More information on ‘additional control measures’

Use safety cabinets and other contained equipment:

* A microbiological safety cabinet or other form of primary containment (e.g. sample containment during centrifugation) should be used when infected material may be dispersed, for example by tissue homogenisation, vigorous mixing etc. There is no substantive evidence that supports aerosol transmission of Hepatitis B and HIV. However, where handling or processing may generate aerosols, large droplets or splashes, appropriate containment control measures must be adopted.
* The notable exception to the above is for work on respiratory material, such as sputum and lung tissue. These **must always** be handled in a microbiological safety cabinet because of the potential risk from M. tuberculosis and other respiratory pathogens such as SARS-CoV-2, even if there is no reason to believe the pathogen is present. As stated above, for respiratory samples (such as swabs and sputum) during the present pandemic, refer to the [COVID-19 and SARS-CoV-2 guidance](https://www.ucl.ac.uk/safety-services/sites/safety-services/files/guidance_for_laboratory_work_with_sars-cov-2.docx).

Wear gloves:

* Disposable nitrile gloves should be worn at all times when handling human material in the laboratory. This is particularly important when handling higher risk samples.
* If gloves become punctured or grossly contaminated, they should be removed and disposed of, hands washed and clean gloves put on.
* When you finish handling samples, gloves should be removed, discarded and hands washed.

Avoid the use of sharps including glassware:

* The use of glassware and sharps should be prohibited. If this is not feasible, then handling procedures should be designed to minimise the likelihood of puncture wounds.
* Glass items should be replaced with plastic alternatives. Glass pipettes must not be used. These measures are particularly important for higher risk samples.
* If it is necessary to use sharps, then used sharps should be placed directly into a sharps bin. Equipment should not be put down and transferred later as this increases the risk. Needles should never be re-sheathed. Sharps bins should not be overfilled.
* The term ‘sharps’ should be taken to refer to any item that is sharp and not be restricted to needles and scalpels. Commonly used items that could easily cause damage to the skin include all glass items (including microscope slides and cover slips), ampoules, pointed nose forceps, dissection instruments, scissors and gauze grids used in electron microscopy work. This list is not exhaustive and all items should be assessed for sharp edges.

Work should be carried out in a designated area of the laboratory:

* Systems of work should be in place to ensure that the person carrying out the work is free from the risk of disturbance from others in the laboratory.
* In open-plan, multi-user laboratories, work should be undertaken in a designated side room or separated from other work activities because of the risk of disturbance. This could be achieved either by a clearly defined designated work station or by carrying out work at quieter times, for example at the beginning or end of a day.
* The work station should be cleared of any unnecessary equipment or apparatus before the work starts.

## Vaccination

Prior to working with blood, blood components or unfixed human tissue, your line manager should arrange a referral to Workplace Health for [vaccination against Hepatitis B](https://www.ucl.ac.uk/joint-research-office/news/2016/oct/researchers-and-hepatitis-b-vaccination) or confirmation of immunity.

## Accidental exposure

If you have been, or think you have been exposed to blood or body fluids, follow the procedure outlined by [Workplace Health](https://www.ucl.ac.uk/human-resources/sites/human-resources/files/accidental_exposure_poster.pdf) online. You may be advised to take [PEP](https://www.nhs.uk/conditions/hiv-and-aids/treatment/#:~:text=Emergency%20HIV%20drugs&text=PEP%20must%20be%20started%20within,every%20day%20for%201%20month.) to prevent HIV infection. Always report incidents to your line manager and/or record as an accident on [riskNET](https://ucl.oshens.com/AIR2/Incbook/incbook_tab_begin.aspx?First=1).

## Approaches to emerging pathogens

The guidance in this document may be varied from time to time to reflect the emergence of novel pathogens, or infectious disease outbreaks, such as COVID-19. Temporary measures may be recommended, taking a precautionary approach until more is understood about epidemiology and pathology. This document may be updated frequently and should be referred to on a regular basis, by saving a hyperlink to your favourites.

## Document control

|  |  |
| --- | --- |
| Version 1 | First issued by UCL Safety Services 23rd June, 2020. |
| Version 2 | Updated 6th August 2020 – redirection to COVID-19 specific guidance removed for CSF samples.  |
| Version 3 | Updated 24th February 2021 – removal of reference to an 8 week period relating to vaccination. |

1. Derogation is an approved exemption from, or relaxation of, a rule or law. In this case, it could mean a negative pressure cascade or HEPA filtration is not required. [↑](#footnote-ref-1)