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<b>Decision:</b> KI Biosafety committee		<b>Type of document:</b> Rules	
<b>Handled by:</b> Security and Environment Unit		<b>Prepared by:</b> KI Biosafety committee	
<b>Revision with regard to:</b> AFS 2018:4			

**KI's management system for the environment and sustainable development**  
**Rules for the handling of blood and other human sample materials**

This document describes how blood and other human sample materials are to be handled at Karolinska Institutet's laboratories<sup>1</sup>.  
 For the relevant legislation, see AFS 2018:4 "Smitttrisker"

**The guiding principal in these regulations is that all blood and materials contaminated with blood is treated as infectious.**

<b>Definition of 'human blood'</b>	Human blood is also blood products/tissue and material that has come into contact with blood/blood products/tissue that have not been decontaminated. This includes, therefore, blood plasma, spinal fluid, brain tissue, sputum, primary cell cultures etc., as well as all materials, such as pipette tips and cannulas that have come into contact with these. The regulations also encompass blood and materials that are contaminated with blood from non-human primates.  These regulations do not apply when propagating microorganisms from blood, instead the regulations with respect to microorganisms in AFS 2018:4.  Please see the separate document regarding the handling of materials from animals in general (animal by-products).
<b>Cell cultures</b>	Cell cultures are also encompassed by these rules if they are primary cell cultures and from either humans or primates.

<sup>1</sup> In the case of activities which take place in Karolinska University hospital, the hospital's rules apply



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<b>Infection through the skin and mucous membranes</b>	<p>Blood does not usually cause infection through undamaged skin, but can cause infection through small wounds in the skin, including, for example, eczema. This should be taken into consideration when working. Please see the additional information below regarding protective equipment.</p> <p>Mucous membrane exposure, such as the mouth and eyes, also involves a risk of infection.</p>
<b>No requirement for permission to handle blood</b>	<p>Permission is not required in order to handle blood, provided that no microorganisms are to be grown/cultured in the sample. Neither does the laboratory need to be notified to the Swedish work environment authority. However, the handling of blood and other human sample material is regulated and the requirements are described in this document and in AFS 2018:4.</p>
<b>Requirements for the laboratory</b>	<p>The laboratory must be at least a biosafety level 2 (BSL2) laboratory according to risk assessment and marked with the warning sign for biological hazard and indicate the biosafety level. As additional information, it may be specified what is handled in the laboratory and that only authorized personnel have access.</p>
<b>Risk assessment</b>	<p>The manager is responsible for investigating and assessing the risks of illness and accidents. The risk assessment is conducted together with staff that has expertise in the field and safety delegates must also be given the opportunity to participate.</p> <p>Risk assessment may take place, for example, with the help of the risk assessment form HUMRA that is available from <a href="https://ki.se/en/staff/biosafety">https://ki.se/en/staff/biosafety</a>.</p>
<b>Written instructions</b>	<p>There must be written instructions about the handling of blood at each work site. The written instructions must be based on a risk assessment. The written instructions must at least include:</p> <ul style="list-style-type: none"> <li>• Where the handling may be conducted.</li> <li>• Who is responsible.</li> </ul>



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	<ul style="list-style-type: none"> <li>• Who may work with blood (how new members or staff can get training about infection risks, routes of transmission, how to avoid infection and protective measures, including vaccinations before they may begin work).</li> <li>• The risks of the blood in question, a description of the method and which elements constitute the greatest risks.</li> <li>• Choice of protective equipment (for the work technical aids and personal protection equipment that prevents needle-stick injuries, cuts and contact with skin and mucous membranes)</li> <li>• Which procedures should be used, such as specific hygiene measures<sup>2</sup> /cleaning/disinfection/procedures for leaving the laboratory.</li> <li>• Management of solid and fluid waste materials.</li> <li>• Incident procedures, including contact details.</li> <li>• Procedures for transporting materials within and outside of KI, if applicable.</li> <li>• Other staff that may require information about the risks and how this should be done.</li> </ul>
<b>Who may work with blood</b>	<p>Work may only be conducted by those who have been trained in the risks of infection, how to avoid infection, routes of transmission, protective measures and measures in the event of undesirable events, as well as specific hygiene. This document contains information about the potential infection risks that can arise when handling blood, as well as routes of transmission. Researchers must also be informed about the local protective measures via the written instructions that must exist for the handling of blood (see above). Hepatitis B vaccination will be offered to all those who handle blood at Karolinska Institutet. Please see the detailed information</p>

<sup>2</sup> § 14 in [AFS 2018](#)



# Karolinska Institutet

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	under "Hepatitis B, Infection Risks", below, and Karolinska Institutet's homepage <sup>3</sup> .
<b>Working techniques and hygiene</b>	In general specific hygiene measures <sup>2</sup> apply when handling blood. In brief, the laboratory assistant must avoid the creation and spread of aerosols, spills and splashes. A lot of aerosols are created when liquids are poured from one vessel to another; therefore, this should either be avoided or take place in a microbiological safety cabinet. Disinfect all materials and all surfaces and wash and disinfect hands once the work has been completed
<b>Waste management</b>	This waste is infectious according to Karolinska Institutet's waste management rules <sup>4</sup> . In brief, liquids/materials may not end up in the drain/general waste without having first been inactivated by a verifiable method.  The waste container for sharps must be safe against breakthrough of sharp objects and must not be reused. According to § 15 in AFS 2018:4, a sanctions fee of SEK 150 000 must be paid if such container is missing when at using sharp objects that have been in contact with blood or other human sample material.
<b>Disposal and control of spills</b>	Please note that viruses dried in serum may remain infectious for several days. In the case of small spills, 70% ethanol can be used, for larger spills an oxidising agent should be used, such as chlorine or Virkon, as blood has a buffering ability. Please note that chlorine is considered as dangerous waste according to KI's waste management rules. Dry bench surfaces and centrifuges every day with 70% ethanol (oxidising agents damage apparatus/surfaces).
<b>Accidents/first aid</b>	<u>Spill in the eyes/mouth/mucous membranes:</u> Rinse well, preferably with eyewash or sterile sodium chloride solution. Alternatively,

<sup>3</sup> [Vaccination at Karolinska Institutet](#)

<sup>4</sup> More detailed information can be found at <https://ki.se/medarbetare/laboratorieavfall> , separate rules apply to hospital facilities.



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	<p>tap-water may be used. If there are contact lenses, remove these and wash again.</p> <p><u>Needle-stick injuries/cuts and skin exposure:</u> Wash immediately using large quantities of soap and water, followed by disinfection with hand sanitiser/70% alcohol.</p> <p>In cases of suspected exposure to blood infections, immediately contact the line manager and occupational healthcare (during their consulting hours, alternatively the infection clinic at Karolinska University Hospital).</p>
<b>Near-accidents and work-related injuries</b>	<p>In the event of a puncture injury, immediately contact Previa occupational health services to have a "blank/zero" blood test. Inform your immediate manager of what has happened. The manager will, after consulting with Previa if needed, determine if the incident should be reported as a work-related injury to the Swedish Work Environment Authority or only be reported to the KI incident reporting system.</p> <p>Punctures or lacerations shall be reported both to the Swedish Work Environment Authority and Swedish Social Insurance Agency at <a href="http://www.anmalarbetsskada.se">www.anmalarbetsskada.se</a> if:</p> <ul style="list-style-type: none"> <li>•known or strongly suspected contaminated blood is involved,</li> <li>•there has been a contact with materials/patients/persons where it is a known or suspected serious contamination.</li> </ul> <p>A <i>simple incident</i>, i.e. an incident that could have caused injury but did not:</p> <ul style="list-style-type: none"> <li>• Needle-stick injury or cut, for example, a filled hazardous waste container or the discovery of a cannula in the washing</li> <li>• blood spill/blood infected material in the eyes, mucous membranes of the mouth or on damaged skin</li> </ul> <p>only needs to be reported in KI's electronic system for reporting incidents. Incident report must be made in order to provide</p>



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	evidence in the case of any subsequent infection and to provide the basis for any compensation for occupational injury.
<b>Transport</b>	This type of samples must be transported as "Biological Substance, Category B, UN 3373" or "excluded medical specimen" when they are transported outside of the respective campus. Please see the document 'How to Pack Specimens correctly' <sup>5</sup> from the Public Health Agency of Sweden. Please note that this also applies when transporting samples between different campuses/hospitals.

## Personal protective equipment and technical equipment

<b>Protective clothing</b>	Lab coats must be worn. The coat may not leave the work area. If the coat has been contaminated or is suspected of having been contaminated by blood it must be decontaminated before it is sent for cleaning, for example, by being autoclaved.
<b>Protective gloves</b>	Gloves must be worn in order to protect against exposure when handling blood. Hand washing and hand disinfection must always take place after removing the gloves. Remember that the gloves can become infectious, change them frequently. Disinfectant interferes with the protective qualities of gloves. The choice of gloves should be adapted to the task and the level of exposure.  Use gloves that are adapted for laboratory purposes and blood handling (marked with EN374-2 and with the biohazard symbol, e.g. Orange Nitrile from Nordic Biolabs).
<b>Spill protection</b>	Use protective glasses and mouth guard/visor if there is a risk of aerosols being created or splashes. A Plexiglas

<sup>5</sup> Please see [KI's English translation of the guide "Packa provet rätt"](#), compiled by the Swedish Institute for Communicable Disease Control (Folkhälsomyndigheten)



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	panel or a microbiological safety cabinet can also function as splash protection.
<b>Needle stick injury/cut protection</b>	Sharp objects, such as cannulas, razor blades and sharp glass objects, should be avoided, where possible, when handling blood. Sharp objects must be supplied with a working integrated safety function if there is a product produced for this purpose and available on the market. If this product does not exist, several other products are available on the market that can reduce the risk of needle stick, injuries/cuts, such as blunt needles. If cannulae are used, never re-cap the cannula; instead deposit the exposed cannula immediately in the sharps container (preferably fitted with a cannula remover).

## Risks of Infection

<b>Additional rules for cases where the blood is known to be infectious</b>	As a rule, all blood is handled as if it was infectious; therefore, there are no additional handling requirements for blood that has a known infection risk. The risk assessment will form the basis of the choice of protective measures, depending on the risk.
<b>Whole blood/buffy coats/plasma/cells from the Swedish Blood Centre</b>	Researchers most frequently have access to blood from the Swedish Blood Centre before it has been tested for known blood-borne infections. The material must, therefore, be treated as potentially infectious.
<b>Hepatitis B</b>	Hepatitis B infection is the greatest risk when handling blood. It is estimated that there is a 6-30% risk of infection in cases of inoculation with hepatitis B positive blood. <sup>6,7</sup>



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	<p>Therefore, it is important that staff who may be exposed are offered pre-exposure vaccination. Vaccination is offered free of charge to all staff who handle blood at KI via the occupational healthcare service.<sup>8</sup></p> <p>Hepatitis vaccine is often considered to provide complete cover only after the third dose. The occupational healthcare service offers the vaccine Engerix-B via any of the following vaccination schedules: 0, 1, 6 months, 0, 1, 2 months or 0, 1, 3 weeks. In the case of quick vaccination, a booster dose is recommended after 12 months in order to ensure long-term protection. The hepatitis B vaccine is also effective when given as post-exposure prophylaxis, with or without concurrent administration of hepatitis B immune globulin.<sup>9</sup></p> <p>The incubation period is about 2-6 months. The first symptoms are often poor appetite, feeling unwell, muscle and joint pains and a mild fever, but infection may also be asymptomatic. Subsequently, symptoms of liver dysfunction, such as a yellow discolouration of the skin, mucous membranes and sclera, and also white discolouration of the faeces and dark discolouration of the urine may occur. In about 1 case in 20 the infection becomes chronic and complications such as cirrhosis and liver cancer may occur.</p>
<b>Hepatitis C</b>	<p>There is neither a vaccine nor post-exposure prophylaxis against hepatitis C. It is estimated that there is about a 3% risk of infection in cases of inoculation with hepatitis C positive blood.<sup>4</sup></p>

<sup>8</sup> Additional information is available at KI homepage "[Vaccinations](#)"

<sup>9</sup> <https://www.folkhalsomyndigheten.se/smittskydd-beredskap/vaccinationer/vacciner-a-o/hepatit-b/> (in Swedish)



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	The symptoms and incubation period are similar to those of hepatitis B, but there are a greater proportion of asymptomatic carriers. The risk of becoming a chronic carrier is about 80% and the risk of complication is greater than for hepatitis B.
<b>HIV</b>	There is no vaccine against HIV, but post-exposure prophylaxis is available. There is an estimated risk of infection of 0.3% in cases of inoculation with HIV positive blood. <sup>4</sup>
<b>Other risks of infection</b>	Hepatitis D and G, HTLV1 and 2 and several other viruses and bacteria, prions and prion-like proteins as well as unknown agents can also involve a risk, but the risk is generally lower.