

**UNIVERSITY OF LEICESTER, LOUGHBOROUGH UNIVERSITY
&
UNIVERSITY HOSPITALS OF LEICESTER NHS TRUST
JOINT RESEARCH SUPPORT OFFICE
STANDARD OPERATING PROCEDURES**

**Research Space SOP 5007
v1.1 February 2018**

**Use and Maintenance of
Research Space Centrifuges**

PGC Registration: C18/2018

OFFICE BASE

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1. Background

Research Space at the University Hospitals of Leicester (UHL) supports the conduct of a broad range of clinical studies, some of which require the use of laboratory centrifuges. To ensure staff safety and the integrity of research samples, it is essential that all Research Space centrifuges are operated and maintained correctly and that staff are aware of required actions in the event of equipment failure or malfunction.

Centrifugation is the process of separating either liquids of differing density or particulate matter from a liquid suspension. Sample tubes are placed in the centrifuge in appropriate carriers or rotors and centrifuged at a set **speed** (RPM) or **force** (g). It is sometimes necessary to centrifuge samples in refrigerated conditions to ensure sample integrity.

Centrifuges within Research Space come in a range of sizes and capacities and from a range of manufacturers, but these essential parts are common to all:

- **Sample Chamber:** Accessed via the lid, which has a security locking system to prevent opening whilst the centrifuge is in use.
- **Rotors/Carriers:** Different rotors/carriers can usually be fitted to the centrifuge in order to match the sample container and the required performance. These will either be fixed or consist of a rotor arm with removable 'buckets'. All buckets have screw-on lids (or 'shields') to prevent sample aerosols from leaking out into the sample chamber. These must always be used when centrifuging primary material (e.g. blood).
- **Control system:** Centrifuges have digital or analogue controls to program the speed (or force) of the rotation, the duration of spin and (where applicable) the chamber temperature.

2. Purpose

This policy describes the routine operation and maintenance of all centrifuges located in or managed by Research Space, with the aim of standardising practice and ensuring:

- the safety of staff using Research Space centrifuges

- the quality and integrity of research samples
- the protection of centrifuges from mechanical damage
- the on-going maintenance schedule is correctly followed

3. Scope

This policy applies to all Research Space owned or managed centrifuges and to all staff operating centrifuges owned or managed by Research Space. It also applies to the Research Space administration staff, housekeeper, laboratory supervisor and Senior Management Team (SMT).

4. Responsibilities

All staff using Research Space centrifuges are responsible for:

- familiarising themselves with this policy and ensuring they are adequately trained in the use of all relevant equipment before operating any of the Research Space centrifuges
- ensuring they are appropriately delegated by the Principal Investigator (PI) and working to the protocol/study manual (or equivalent) at all times
- following all relevant UHL and local policies/procedures/manuals whilst using Research Space equipment and facilities
- wearing relevant PPE, as per local and UHL guidance
- visually inspecting any equipment before, during and after use and reporting damaged or faulty equipment immediately
- never circumventing any of the centrifuge built-in safety features (such as lid-closure override switches)
- ensuring centrifuges are programmed in accordance with the parameters specified in the study protocol (or, in the absence of specific parameters, those specified in this Policy)
- cleaning any spills according to UHL and local policies/procedures and leaving equipment as per local policy and manufacturers' recommendations

The PI (or delegated main contact) is responsible for:

- ensuring that Research Space approval is in place before any Research Space equipment is used
- ensuring a Research Space centrifuge is available that matches the requirements of the study protocol before undertaking any study procedures (this includes approving the procurement of all necessary centrifuge adaptors identified at the study approval stage)
- ensuring that delegated staff are adequately trained and are following study protocols

The Research Space administration team are responsible for:

- arranging maintenance, repair or replacement equipment (where possible)

The Research Space housekeeping staff are responsible for:

- ensuring all Research Space centrifuges are routinely cleaned according to local policy and manufacturers' recommendations
- visually inspecting Research Space centrifuges on an on-going basis and reporting damaged or faulty equipment to the administration team

The Research Space Laboratory Supervisor is responsible for:

- orientation of staff prior to the operation or cleaning of Research Space centrifuges
- visually inspecting Research Space centrifuges on a monthly basis and reporting damaged or faulty equipment to the administration team
- maintaining general oversight of staff operating or cleaning Research Space centrifuges

The SMT (or delegated staff) are responsible for:

- approving the use of Research Space facilities and equipment, as per the Research Space Application Process (RS-5000)
- approving maintenance/repair/replacement of centrifuges, as required
- oversight of equipment and maintenance logs to ensure centrifuges are being properly maintained

- maintaining general oversight of staff operating or cleaning Research Space centrifuges
- monitoring compliance with this policy

5. General Information

5.1. Approvals

- Use of Research Space centrifuges is by prior agreement only (see RS-5000 – Research Space Application Process)
- It is the responsibility of the PI (or delegated main contact) to ensure that there is a Research Space centrifuge available that matches the requirements of the study protocol before agreeing to undertake a study
- In some cases, additional adapters may be required to enable study-specific sample containers to be placed in Research Space centrifuges. In this case, study teams will be expected to cover the cost of these adapters, but they will remain the property of Research Space

5.2. Orientation

- Individuals using Research Space owned or managed centrifuges must complete a Research Space laboratory orientation as per the Research Space Orientation policy (RS-5006).
- Orientation sessions are held on a monthly basis and can be booked through the Research Space Administration team.
- Laboratory orientation DOES NOT constitute formal centrifuge training. It is strongly recommend that new users familiarise themselves with the centrifuge manufacturers' operations manual and undertake supervised practice to ensure they are competent in the use of the equipment.

5.3. Availability

- Research Space centrifuges cannot be booked in advance and availability cannot always be guaranteed e.g. in the event of a breakdown
- Individual staff members are responsible for checking that a centrifuge is available before bringing samples to Research Space for processing

6. Use of the centrifuge

6.1. PPE

When using any Research Space owned or managed centrifuge, suitable personal protective equipment (PPE) must be worn as per UHL Personal Protective Equipment at Work Policy and local guidelines. Users should ensure that hand hygiene is in accordance with the UHL Hand Hygiene policy.

6.2. Safety checks

Before placing samples into a centrifuge, the following actions must be taken:

- Check that the centrifuge is within its service dates (check service sticker)
- Visually inspect the centrifuge for signs of internal or external damage
- Check the sample chamber for debris or spillage
- Manually spin the rotor arm to check that it spins freely

Before use, remove any debris and clean spills. If there are any signs of damage do not use the centrifuge and report to a senior member of staff.

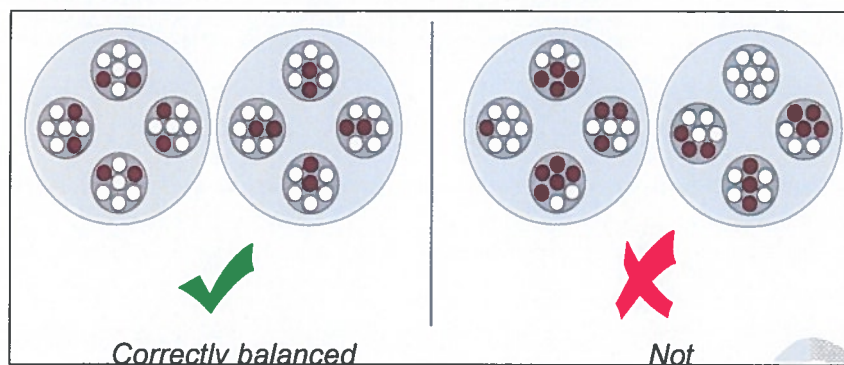
6.3. Sample preparation and processing

- All samples must be prepared / processed in accordance with the study protocol, laboratory manual or working practice guideline.
- All substances to be centrifuged must be placed in an appropriate, leak-proof container.
- Ensure all containers are appropriately labelled - at a minimum this should include a unique subject identifier and date.

6.4. Loading the centrifuge

- It is important that all samples are placed in the rotor/carrier in such a way as to ensure the correct balance of the rotor.
- Always position each sample diagonally opposite a paired, balanced sample (see diagram overleaf). If spinning individual sample tubes, these must be balanced using a second, identical, sample tube filled to a similar level with water.

- Failure to correctly balance a centrifuge poses a safety risk to staff and could result in damage to the centrifuge.



6.5. Programming

- Centrifuge programming is based on the following parameters:
 - force or speed of centrifugation
 - duration
 - temperature (if applicable)
- To ensure consistent processing, study protocols often specify a centrifugation *force* (g) rather than speed (rpm). This is because different centrifuges running at the same speed will not necessarily exert the same force on samples, as this is dependent on the diameter of the rotor arm.
- Where a centrifuge only allows programming of speed (rpm), a conversion must be made (from g to rpm); a conversion chart for this purpose is displayed in all Research Space managed laboratories.
- Centrifuges must always be programmed using study specific parameters. If no settings are provided, programme to the default setting of:

1200g (or equivalent RPM) for 10 minutes

6.6. Operation

- Ensure the lid is firmly closed before starting the centrifuge.
- Do not lean or place items on the centrifuge while it is operating.
- Research teams **MUST** ensure the centrifuge is continuously monitored when in use.

6.7. Abnormal running

In the event of excessive noise or vibration during operation, stop the centrifuge immediately and investigate the cause. If no obvious reason can be identified (e.g sample imbalance) the following actions MUST be taken:

- Take the unit out of service by disconnecting from the power source and clearly labelling it 'DO NOT USE'. On the label, state the reason, date and name of the person reporting the fault.
- Report immediately to the administration team to organise repair/replacement.

6.8. Incidents / Accidents

In the event of an incident or accident during centrifugation:

- Turn the centrifuge off and disconnect it from the power source (if safe to do so)
- Notify others in the laboratory and evacuate (if necessary)
- Seek medical assistance as appropriate
- Notify to a senior member of staff on duty and follow the UHL policy for Incident and Accident Reporting (i.e. Datix)

6.9. Spillage

In the event of sample spillage:

- Clean and decontaminate the centrifuge according to the UHL Cleaning and Decontamination for Infection Prevention policy.

In the event of a suspected spillage during centrifugation:

- Stop the centrifuge immediately and ensure the lid is kept closed for a minimum of 30 minutes to allow for any vapour to settle.
- Clearly label the centrifuge 'DO NOT OPEN'. Include the reason, date, time and name of the person reporting the fault.
- After 30 minutes, open the lid and carefully remove any broken sample tubes and discard as per UHL Waste Management Policy.
- Clean and decontaminate the centrifuge according to the UHL Cleaning and Decontamination for Infection Prevention policy.

7. Maintenance

7.1. General maintenance

- All centrifuges should be cleaned as per manufacturers' recommendations following the schedule in the Standard Operating Procedure for Housekeeping within Research Space (SOP-5001)
- Dry all surfaces immediately after cleaning to prevent corrosion.
- In the event of condensation forming, dry the centrifuge chamber by wiping out with an absorbent cloth.
- Ensure the grooves of swing buckets are free of contamination.
- Lubricate the buckets and shields with grease if necessary.

7.2. Servicing

- On an annual basis, all centrifuges must be:
 - serviced
 - calibrated (where possible)
 - formally tested for electrical safety (PAT tested).
- A service record must be kept for monitoring purposes (copies of certificates are available from the administration team on request).

8. Related documents

- RS-SOP 5001 - Housekeeping within Research Space, LRI
- UHL A10/2002 - Incident and Accident Reporting
- UHL A15/2002 - Waste Management Policy
- UHL B10/2002 - Control of Substances Hazardous to Health (COSHH) Policy
- UHL B32/2003 - Hand Hygiene Policy
- UHL B9/2004 - Personal Protective Equipment at Work Policy
- UHL B5/2006 - Cleaning and Decontamination for infection prevention
- Relevant PPE risk assessments
- Manufacturer's Operations Manuals

9. List of Appendices: None

10. Approval and sign off

DEVELOPMENT AND APPROVAL RECORD FOR THIS DOCUMENT			
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Approved by:	Prof. Nigel Brunskill	Signature	Date Approved
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