

Standard Operating Procedure Centrifuge Safety			
SOP Number:	SOP-CS-01.1	Category:	Lab Equipment
Supersedes:	SOP-CS-01	Effective Date:	December 1, 2017
Subject: CENTRIFUGE SAFETY		Pages	8

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1.0 POLICY

This procedure describes the standard operation for using the ambient and refrigerated centrifuges located in the Research Centrifuge Room (Connell 4, Room 2-4-041) in the W.J. Henderson Centre for Patient-Oriented Research (WJHCPOR).

The centrifuges are delicate pieces of equipment. Rotors on centrifuge units are subject to mechanical stress that can result in rotor failure. In addition, improper loading and balancing of the rotor can cause it to break loose while spinning. For these reasons, the centrifuge must be properly used and maintained.

Failure to follow proper operation of the centrifuges may not only result in damage to the equipment and biological samples, but also cause injury to the user who is operating it.

2.0 PURPOSE

All users of the centrifuges in the WJHCPOR are required to be trained by a designated Kingston General Health Research Institute (KGHI) staff member prior to using the centrifuges in order to familiarize themselves with the function, specifications, operation and routine operator care and maintenance of the centrifuges to ensure safety.

2.0 RESPONSIBILITY

Users are responsible for:

- Attending orientation and training on the ambient temperature and refrigerated temperature centrifuges. Training will include lab safety and use and care and maintenance of the centrifuges. Training is mandatory and is required to be completed before users are allowed to operate the centrifuges.

- Operating and maintaining all centrifuges in accordance with manufacturer's instructions and good safe laboratory procedures.
- Reading and following all instructions for safe usage and maintenance of the centrifuge.
- Selecting the appropriate rotors/tubes for the protocol in use.

NOTE: IF AT ANY TIME YOU ARE UNSURE HOW TO OPERATE THE CENTRIFUGES SAFELY, PLEASE REFER TO THE INSTRUCTION MANUAL FOR FURTHER DETAILS AND/OR ASK THE DESIGNATED KGHRI STAFF MEMBER FOR ASSISTANCE.

- Filling out the Centrifuge Usage Log each time the centrifuge is used.
- Reporting any damage to the centrifuges or the rotors to the designated KGHRI staff member immediately so equipment repairs can be made.
- Wearing appropriate PPE (lab coat, safety glasses, and gloves).

KGHRI is responsible for:

- Ensuring all centrifuges are in good repair and labelled with appropriate contact information for maintenance and repair.
- Training new users in safe usage and maintenance of the centrifuges, documenting the training of all users, and supervising use when necessary.
- Ensuring that the Centrifuge Usage Log is kept close to the equipment and that all users fill out the Centrifuge Usage Log.
- Ensuring all copies of user instructions (see Appendix A) on balancing loads in the rotor, maximum G loads in RPM, and filling and sealing samples are readily available to all users.
- Ensuring that all the regular and periodic maintenance required is carried out and recorded in the Maintenance Log.
- Ensuring the records of repair are kept and available for inspection.

3.0 PROCEDURES

Operational Procedure

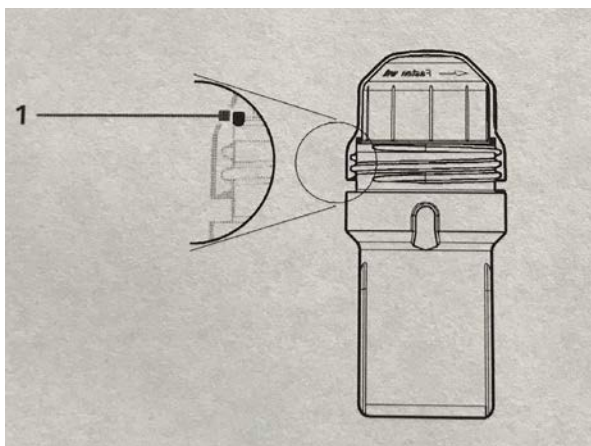
Rotor Buckets (metal) and Rotor Bucket Inserts (sample tube holders)

- It is important to always use the correct rotor bucket insert for the tubes to be centrifuged.

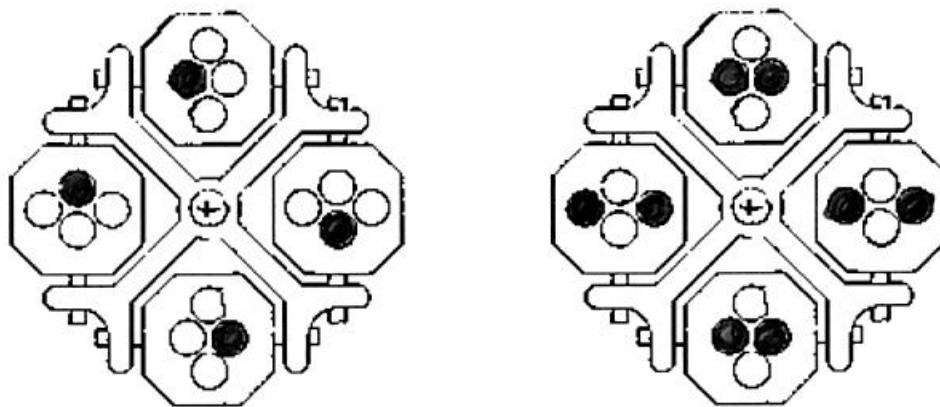
- Rotor bucket inserts are always used in **PAIRS** and **MUST ALWAYS** occupy the bucket directly across from each other.

Loading of Samples

- Load tubes into the buckets. Use the aerosol resistant caps provided for the rotor buckets. Close the round bucket using an aerosol-tight cap. Check the sealing ring (O-ring) in the cap (Item 1 in the figure below) to ensure that the sealing ring is not damaged and is seated evenly in the groove. Place the aerosol resistant caps on and screw the caps on tightly.



- Symmetrically distribute balanced buckets or tubes. Always use tubes of the same type (weight, material/density and volume).
- Always operate the centrifuge with all buckets in place, even if two opposing buckets are empty (see image below). **RUN ROTORS WITH A FULL SET OF BUCKETS.**



Instrument Safety Features

- All centrifuges must have a lid lift assisting struts which enable the lid to be raised without effort and hold the lid in the upper most position for loading, unloading and servicing. **IMPORTANT:** As the lid lift assist struts age they slowly lose the ability to hold the weight of the lid. When this situation is identified, notify the designated KGHRI staff member as a service call must be placed to correct this safety issue.
- All centrifuge lids must be lowered to the closing position and then slight pressure needs to be applied to the front edges of the lid until the electronic locking mechanism engages. This will be an audible 'clicking' sound. **NOTE:** The centrifuge will not operate unless the electronic locking mechanism is engaged. If the instruments lid fails to lock notify the designated KGHRI staff member as a service call must be placed to correct the issue.
- Pressing the start/stop button at any time during the centrifuge cycle will cause the centrifuge to stop the rotor. Automatic braking will occur under normal conditions of load imbalance.

Emergency Lid Unlock

- **IMPORTANT:** The centrifuge must be unplugged before starting this procedure. The rotor must not be turning when trying to open the lid. Wait until the rotor has stopped turning (to check, look through the monitoring glass in the centrifuge lid) before proceeding with the emergency unlock procedure.
- Each centrifuge will have a different emergency lid unlock method. Consult the individual operator's manual for specific details.

Initiating Centrifugation Cycle

- Prior to pressing the start button ensure the following has occurred:
 - o The centrifuge is switched on.
 - o The rotor has been inserted and attached correctly.
 - o The rotor has been loaded correctly.
 - o Buckets can freely swing out.
 - o The centrifuge lid is closed.
 - o The correct program or speed/run duration time/acceleration-deceleration has been selected.

Setting the Centrifugation Parameters

- Centrifugation Time (min:sec): use the rotary knob **TIME** to set the centrifugation time.

- Refrigerated Centrifugation Temperature (-9 °C to 40 °C): When the centrifuge power is on, the default temperature is set at 4°C. To change the temperature, use the **TEMP** arrow keys to set the temperature.
- Centrifuge Speed: Use the rotary knob **SPEED** to set the speed of the centrifugation. Maximum speed: 3000 x g (4400 rpm). Press knob briefly to switch display of centrifugation speed (rpm or rcf).
- Start the centrifuge cycle.
- Do not leave the centrifuge until full operating speed is attained, and the instrument appears to be running normally without vibration.

Note: It is normal to see a small vibration in the centrifuge as the speed increases, but any large vibration in the centrifuge or irregular noise may indicate that something has gone wrong with the run. Press the **STOP** button and make sure that the tubes are balanced properly.

- If centrifuge cycle is successful, wait until the centrifuge comes to a complete stop prior to opening up the unit.
- Open the centrifuge carefully.
- Remove the sealed buckets (or tubes) slowly and carefully to prevent re-suspension of the sediments; always check for damage to your tubes.
- Sediments and supernatants should be visible after centrifugation.
- When using the refrigerated centrifuge, the centrifuge lid should be left open or ajar when the centrifuge is turned off at the end of your specimen processing so that any condensation present dries as quickly as possible.

Error Codes

- Each centrifuge has programmed error codes to assist in identifying the problem. Consult the individual operators' manual for specific details (located in the binder on the shelf above the centrifuges).
- If the centrifuge stops running or will not start, write down the error code from the main display, and notify the designated KGHRI staff member as a service call might be required to correct the issue.

Reference Manuals

- The Instruction Manual for the ambient and refrigerated centrifuges (same manual) is located in the research centrifuge room (Rm 2.4.041) in the binder on the shelf above the centrifuges (Eppendorf Centrifuge 5702/5702 R/5702 RH Operating Manual).

4.0 MAINTENANCE

Device

- The outer surfaces of the centrifuge and the rotor chamber should be cleaned regularly with a mild cleaning agent. This is for hygiene purposes and to prevent adhering impurities causing corrosion. Before cleaning, unplug the power plug with the lid open, unscrew the rotor using the rotor key supplied and clean it separately. Use Oxivir® wipes for cleaning the accessible surfaces of the equipment. Do not allow any liquid to get into the gap at the motor shaft outlet. For this reason, the rotor chamber should be cleaned only with a damp cloth. The rubber seals in the rotor chamber should be rinsed off thoroughly with water and lubricated with glycerin (supplied) after every clean to prevent them becoming brittle.

Rotors

- The rotors, buckets, tube holders, caps, and adaptors should be cleaned once a month or when necessary with a neutral cleaning agent to prevent residues of the fluids being centrifuged from changing the properties of the centrifuge and its accessories. The rotor must be taken off for this.
- Check the tube holders and buckets for residues and corrosion. For thorough cleaning, remove the rubber plates from tube holders and buckets and clean all parts separately.
- Then refit the rotor and bolt it into place with the supplied rotor key. Check the rotor, tube holders, caps and buckets once a month for mechanical damage.
- The aerosol-tight cap, including the silicon ring, rubber mats and bucket adaptors are subject to normal wear and must be replaced when a visual inspection reveals wear.
- On the swing-bucket rotor make sure, in particular, that the pegs and grooves of the buckets are free of dirt. They should be lightly lubricated with pivot grease (supplied) so the buckets can swing freely.
- The aerosol-tight buckets **MUST NOT** be stored with their caps sealed.

Refrigerated Centrifuge

- Clean condensation water and ice buildup regularly from the rotor chamber (by defrosting), using a soft, absorbent towel.
- Regularly empty and clean the condensation water collector. Remove this from the left. Please clean the condensation water drain regularly.

6.0 SPILLS IN A CENTRIFUGE

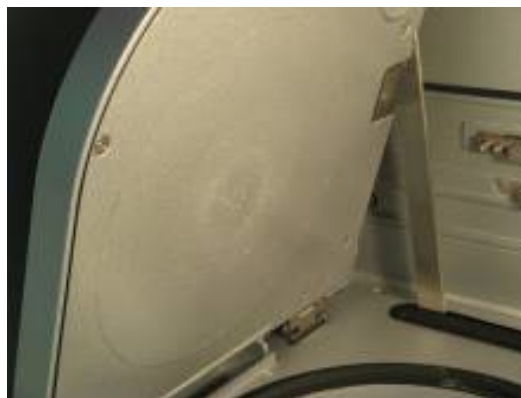
- When you become aware of a spill in a centrifuge, inform any nearby occupants that a spill and likely tube breakage has occurred inside the centrifuge. Post a "Biohazard Spill" sign **ON** the centrifuge (located in the cabinet under the dirty sink):

- Ensure the lid remains closed; do not disturb the centrifuge for 30 minutes after the rotor has stopped to allow aerosols to settle.
- PPE **MUST** be worn before proceeding to the next step.
- Obtain Oxivir® solution and Oxivir® wipes located in the cabinet under the dirty sink.
- Open centrifuge carefully to avoid disturbing the contents which may be up against the lid.
- Assess the extent of the spill and damage of the tubes, buckets, rotor and inner surfaces of the centrifuge.
- **IF YOU ARE ALONE AND NOT ABLE TO CLEAN UP THE SPILL**, contact your supervisor/manager and the designated KGHRI staff member.
- Remove any debris using forceps, tweezers or tongs and place in the yellow Sharps waste bin/container.
- Carefully remove rotors and buckets and place in the plastic centrifuge tub located under the dirty sink. Move the centrifuge tub to the biological safety cabinet (BSC) for further cleaning. Pour contents of disinfectant (Oxivir®) into centrifuge tub allowing the rotors and buckets to soak in the BSC. Ensure all reusable items used in the cleanup (e.g. forceps, dustpans, etc.) are also soaked in disinfectant (Oxivir®).
- After the recommended contact time with Oxivir® solution (5 minutes), remove the centrifuge tub from BSC and place contents into dirty sink. Rinse contents thoroughly with water in the dirty sink. Wash contents with soap and water using cleaning tub located in the cabinet under the dirty sink. Rinse contents and lay out to dry using paper towels on bench. Return contents to the centrifuge or storage bin when dry.
- Dispose spent disinfectant (Oxivir®) from centrifuge tub and soapy water from cleaning tub down the dirty sink with running water.
- Wipe the inside of the centrifuge with disinfectant (Oxivir®). Take steps to inactivate any contamination on surfaces before touching the surfaces. If needed, use paper towel dampened with disinfectant (Oxivir®) to clean the inside of the centrifuge.
- All used paper towels soaked in Oxivir® and/or Oxivir® wipes are to be discarded in the yellow biohazard waste bin/container.
- Remember to wipe out the BSC with Oxivir® wipes as per normal cleaning procedures outlined in Biological Safety Cabinet SOP.
- Place all other waste (e.g. paper towels used to dry centrifuge parts that were not soaked in Oxivir®) into regular waste bin/container.
- For spills and other incident reporting, see “Accidental Occupational Exposure and Reporting Workplace Incidents” SOP.



Always use forceps/tweezers to remove glass or plastic particles

(taken from QIAcube centrifuge)



Clean and disinfect unit lid

7.0 CONTACTS

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8.0 SOP HISTORY

SOP Number	Date Issued	Summary of Revisions
SOP-CS-01	01-DEC-2017	Original version.
SOP-CS-01.1	01-FEB-2018	Centrifuge instruction manual added to policy. New appendix added to policy as "Appendix A".