Insert BA Categorisation (Hazard Group 1 or 2/ or GMO Class 1):
Hazard Group 1

Loughborough University

Health & Safety Unit Use Only	
Ref No:	
Department Use Only	
Ref No:	CBE/ BRA/092

RISK ASSESSMENT OF WORK WITH BIOLOGICAL AGENTS

Please note the following before completing this form:

1. University Health and Safety Policy requires that risk assessment of all work with biological agents (BAs) must be carried out in advance of work commencing. A key requirement of The Control of Substances Hazardous to Health Regulations (COSHH) is to assess the risks associated with any work activity involving the use of biological materials may contain biological agents.
2. YOU SHOULD COMPLETE ALL OF PART A, THE APPROPRIATE SECTIONS OF PART B, AND ALL OF PART C. WHERE HAZARD GROUP 2 BIOLOGICAL MATERIAL IS INTENDED TO BE USED THE RISK ASSESSMENT MUST BE REVIEWED BY THE DEPT/SCHOOL BIOLOGICAL SAFETY ADVISOR AND EXPLICIT APPROVAL IS ALSO REQUIRED FROM THE UNIVERSITY BIOLOGICAL SAFETY OFFICER. THIS FORM SHOULD BE SUBMITTED TO THE HEALTH, SAFETY & ENVIRONMENT UNIT FOR REVIEW VIA YOUR DEPARTMENTAL BIOLOGICAL SAFETY ADVISOR.
3. It is the responsibility of the Principal Investigator/Supervisor to ensure compliance to these requirements and that this risk assessment remains valid.
4. This risk assessment form **IS NOT** for assessing the risks associated with **Genetically Modified Organism activities**.

Date Submitted:	18 Nov 2014	Date Approved:	26 Nov 2014
Version Number:	1	Supersedes *(insert version number if applicable)*	N/A

PART A: Please provide the following general information:

School/Department			
Healthcare Engineering, Centre for Biological Engineering (CBE)			
Title of Project			
A study of biocompatibility of PHBV/Icariin scaffolds to Human mesenchymal stem cell line (MSC)			
Project Reference Number:	N/A		
Person responsible for this work (*Principle Investigator*)			
Name:	Yang Liu	Position:	Senior Lecturer
Department:	Healthcare Engineering, Centre for Biological Engineering (CBE)	University School:	Wolfson School
Person conducting this assessment			
Name:	Hairong Liu	Position:	Academic Visitor
Department:	Healthcare Engineering, Centre for Biological Engineering (CBE)	Date Risk Assessment Undertaken:	14/11/2014
Proposed Project Start Date:	01/11/2014	Proposed Project End Date:	31/01/2015

A1 PROJECT SUMMARY

A1.1 Scientific Goals of the Project.

This provides a useful background for the reviewer and reader. It need only be brief and should provide an overview of the scientific goals.

The aim is to evaluate the biological response of human osteoblast cells (HOS) and mesenchymal stem cells (MSCs) to scaffolds. The initial experiment includes the use of scaffold samples (pure Carbon, pure PHBV, PHBV/Icariin and PHBV/Ca2SiO4 scaffolds), the samples will be incubated in media at 37°C, 5% CO2 in 6 well plates. And cells will be seeded on them. Icariin will be released into the media during cell culture and the effect of Icariin on cells (HOS and MSCs) will be assessed.

Techniques include; cell culture, cell passaging, thawing and cryostorage, cell staining, cell culture analysis of cell viability through imaging techniques and various assays. Analysis of cell phenotype at gene level. Analysis of scaffold materials degradation from chemical and physical perspective (Flame Atomic Absorption Spectrometry, SEM, XRD).

A1.2 Description of the Experimental Procedures

Describe laboratory procedures to be used and highlight any non-standard laboratory operations. This may need cross reference to supporting documentation i.e. protocols.

Scaffolds

Carbon, PHBV, PHBV/ICariin and PHBV/Ca2SiO4 scaffolds are brought from Hunan University and all the components of the scaffolds are un-toxic to human cells. The scaffolds will be COSHH assessed separately if the MSDS shows they are hazardous.

Cell source

Human mesenchymal stem cell line (MSC), derived from bone marrow (Lonza UK) and adherent human osteoblast-like cell line (HOS) are available at the CBE laboratory storage.

Cell culture and passaging

Cells will be obtained from cell bank vials, the vials will be removed from liquid nitrogen storage wearing appropriate PPE. The vials will be thawed using the procedure detailed in "SOP032 Resuscitation of Cryo-preserved Mammalian Cell Lines". The vial will be placed in a water bath at 37°C, then transferred into the BSC once thawed. The cells are transferred to warmed media, centrifuged and the pellet resuspended in fresh media.

MSCs will be cultured in DMEM supplemented with 10% foetal calf serum, 2mM L-glutamine, 1% Non-Essential Amino Acids, antimycotics and incubated at 37°C under 5% CO_2. HOS will be cultured in EMEM supplemented with 2mM L-glutamine, 1% Non-Essential Amino Acids, and 10% foetal calf serum (COSHH for Antibiotic Antimycotic in progress).

Cell passaging when cells are confluent involves; media aspiration from the flask, 3x wash with phosphatase buffered saline (PBS). Trypsin is added to detach cells from the flask. Media is added to flask to stop trypsin from working, centrifugation follows to remove trypsin and cells are resuspended in fresh media and placed in the incubator.

Cell freezing

A working cell bank will be established following standard procedures as detailed in "SOP031 Cryopreservation and Storage of Mammalian Cell Lines" and the cryovials will be stored in liquid nitrogen in the CBE laboratory.

Sterilisation of magnesium samples

The samples will be sterilised by normal autoclave assay.

Cell Observation and Imaging

Growth of the cells will be monitored by using an inverted microscope during cell culture and expansion. Cell count will be performed using a haemocytometer according to SOP034 "viable cell count assessment using the haemocytometer".

PART B: Please provide information in one or more of the following sections, as appropriate. Only sections which you complete should be submitted:

Section 1: *micro-organisms (prions, viruses, bacteria, fungi, parasites in ACDP category 2 and pathogens controlled by the Department for the Environment, Food and Rural Affairs).* ***[Work with ACDP category 3 and 4 pathogens is not currently permitted in the University.]***

Section 2: *cell cultures, tissues, blood, body fluids or excreta*

Section 3: *plants and plant material*

Section 4: *animals and animal tissues*

SECTION 2: CELL CULTURES, TISSUES, BLOOD, BODY FLUIDS OR EXCRETA

B2.1 HAZARD & RISK IDENTIFICATION : NATURE OF CELLS, TISSUES OR BODY FLUIDS

This information gives an indication of the ***potential*** *harm that the biological material may cause*

B2.1.1 List all cells or tissues to be used. ***For cells indicate if primary, continuous or finite.***

Indicate in the adjacent box if Not Relevant (N/R)			
Cell or tissue type and ID	Organ Source	Species	From where will it be obtained?
Human mesenchymal stem cell	Bone marrow	human	Lonza UK (CBE Cell Bank – Ref Q. Rafiq)
Adherent human osteoblast-like cell line	Bone	human	Cell bank (CBE Cell bank, Ref:Yang Liu)

B2.1.2 List all blood, body fluids or excreta to be used

Indicate in the adjacent box if Not Relevant (N/R)		
Material type	Species	From where will it be obtained?
Foetal bovine serum	Bovine	GIBCO Invitrogen

B2.1.3 Has any material listed in section B2.1.1 been genetically modified in any way?

Indicate in the adjacent box as No, Yes or Not Relevant (N/R)	No
If Yes, complete Genetically Modified Organisms (GMO) Risk Assessment Form	

B2.1.4 Will material be screened for infectious agents? (if from a cell culture collection answer B2.1.6 instead)

Indicate in the adjacent box as: Yes, No or Not Relevant (N/R)	NR
If Yes, provide details of the types of screening and agents screened for:	

B2.1.5 Will any clinical history (if relevant) be provided with this material?

Indicate in the adjacent box as: Yes, No or Not Relevant (N/R)	N/R
If yes give details:	
If yes, will a policy of rejection of samples from diseased patients be adopted? Explain	
If yes, how will the information be disseminated in the course of the project?	
If yes, will this information be anonomised?	

B2.1.6 If obtained from a cell culture collection, is safety information provided?

Indicate in the adjacent box as: Yes, No or Not Relevant (N/R)	Yes
If Yes, summarise here: Screening for potential adventitious agents has been performed and the certificate of analysis is available in the CBE files.	

B2.1.7 Has any of the material listed in section B2.1.1 been identified in the list of cross-contaminated or misidentified cell lines, available on HPA website
(http://www.hpacultures.org.uk/media/E50/3B/Cell_Line_Cross_Contaminations_v6_0.pdf

Indicate in the adjacent box as No, Yes or Not Relevant (N/R)	No
If Yes, provide details of the route of provenance back to the originator of the cell line, together with a Certificate of Analysis; identifying the methods used to qualify the cell type.	

B2.2 RISK TO HUMANS

B2.2.1 What is the likelihood of infection of this material? Indicate as None, Low Risk, Medium Risk, High Risk, Known Infected*

Cell type and ID	Risk Category	Justification for Selection
MSCs	Low	Well characterized cell line that has undergone comprehensive quality control and authentication procedures. Cells will be manipulated under biological safety level 2.
HOS	Low	Well characterized cell line that has

		undergone comprehensive quality control and authentication procedures. Cells will be manipulated under biological safety level 2.
		If none proceed to section B2.2.4

see The Managing the risks in laboratories and healthcare premises – available at http://www.hse.gov.uk/biosafety/biologagents.pdf

B2.2.2 If low, medium or high risk (section B2.2.1), name and classify the Biological Agents this material could be infected with. List the biological agents and indicate the ACDP hazard group classification*

Name of Agent	Classification
Not listed	**N/A**

see The Approved List of Biological Agents – available on the Health & Safety website or http://www.hse.gov.uk/pubns/misc208.pdf.

B2.2.3 Describe the route(s) of infection (in humans) for these adventitious agents (place a 'X' in the relevant box)

Percutaneous	Mucocutaneous	Inhalation	Ingestion	N/R
				X
Details:				

B2.2.4 Are there any other biological hazards (other than adventitious infectious risk) associated with the materials e.g. aggressive tumourogenic cell lines

Indicate in the adjacent box as: Yes, No or Not Relevant (N/R)	No
If Yes, describe:	

B2.3 HUMANS AT INCREASED RISK OF INFECTION

B2.3.1 Do any of the agents listed in section 2.1 present an overt risk to humans at increased risk (including immunocompromised workers, pregnant workers, breast feeding mothers)?

Indicate in the adjacent box as: Yes, No or Not Relevant (N/R)	No
If yes, Occupational Health must be consulted:	

B2.4. PROPAGATION OR CONCENTRATION OF ADVENTITIOUS AGENTS

B2.4.1 Will any culturing of this material take place?

Indicate in the adjacent box as: Yes, No or Not Relevant (N/R)	Yes
If yes, identify the cells and the conditions these will grow: Human mesenchymal stem cells and human adherent osteoblast-like cells; cultured at 37°C, 5%CO_2, at high relative humidity in T-flasks and well plates.	

B2.4.2 If culturing, will CD4+ cells be present. Describe what cells and for how long these cultures will be allowed to grow

Indicate in the adjacent box as: Yes, No or Not Relevant (N/R)	No
If yes, explain:	

B2.4.3 If culturing, what is the maximum volume of culture grown?

Indicate in the adjacent box if Not Relevant (N/R)	
Per six well plate: Seeding density: 3500cell/cm^2 x 10cm^2 =35000cells/well 35000x6 wells = 2.0 x10^5 cells per six well plate. 4ml/ well 24ml /plate	**Per experiment:** 18 six well plates (2.0 x10^5 cells) 3.8 x10^6 cells 24ml x 18 plates = 0.4L

B2.4.4 Will the cells be manipulated in any way that could result in a concentration of any adventitious biological agent present?

Indicate in the adjacent box as: Yes, No or Not Relevant (N/R)	N/R
If yes, explain:	

B2.5 WORKING WITH MATERIAL DONATED BY YOURSELF OR COLLEAGUES :

Workers **MUST NEVER** culture, deliberately transform or modify their own cells or cells from their co-workers or workers otherwise associated with the experimental work. *NOTE: This presents a particular hazard since any self-inoculation injury could have potentially serious consequences as cells would essentially circumvent the normal protection of the immune system.*

B2.5.1 Will any cells be donated by persons working in or has access to the lab?

Indicate in the adjacent box as: Yes, No or Not Relevant (N/R)	No
If yes, explain what precautions are to be taken to prevent that person being exposed to the cells:	
If yes, where will this material be collected:	
If yes, provide justification for not using a safer source:	
If yes, how will confidentiality be assured:	
If yes, has Ethics Committee approval been obtained:	

B2.6 ENVIRONMENTAL CONSIDERATIONS:

B2.6.1 Are any of the agents capable of causing disease or other harm in animals, fish or plants?

Indicate in the adjacent box as: Yes, No or Not Relevant (N/R)	N/R

If yes, describe:

B2.6.2 Will there be any other environmental risks?

Indicate in the adjacent box as: Yes, No or Not Relevant (N/R)	N/R
If yes, describe:	

B2.7 OTHER HAZARDS

B2.7.1 Are there any other hazards associated with this work? For example, hazardous chemicals (especially carcinogens, mutagens, substances toxic to reproduction, cytotoxins), cryogenic gases, ionising radiation.

Indicate in the adjacent box as: Yes, No or Not Relevant (N/R)	Yes
If yes, identify these: DMSO - Cryoprotectant added to media to inhibit cell death during freezing, COSHH RA CBE 035 Trypan Blue – essential for manual cell counting – will be used and disposed of in accordance with CBE COP, COSHH RA CBE032 and SOP029 "Safe Handling and Disposal of Trypan Blue. Virkon and 70% IMS-disinfectants used in the laboratory, COSHH RA CBE 039 and COSHH RA CBE 036 and SOP004 "General laboratory housekeeping".	
If yes, have these been risk assessed and any necessary approval obtained? COSHH RA CBE 035 COSHH RA CBE 032 COSHH RA CBE 039 COSHH RA CBE 036	

B2.7.2 Are there any conditions associated with the hazards described in B2.7.1 that require special attention in Section C of this risk assessment? For example, material incompatibilities with disinfectants such as Virkon or hazardous product decomposition associated with high temperatures (ie autoclaving).

Indicate in the adjacent box as: Yes, No or Not Relevant (N/R)	No
If yes, provide details and ensure that appropriate control measures are addressed in Section C:	

PART C: CONTROL MEASURES

C1. CONTROL MEASURES

The risk of exposure must be prevented or adequately controlled to minimise the chance of harm arising. COSHH Regulations require minimum containment measures for laboratories handling organisms from the different ACDP hazard groups (http://www.hse.gov.uk/pubns/misc208.pdf)
The hazard group number typically indicates the level of containment (includes physical measures & working practices) that must be used for its handling).

C1.1 Preventing Exposure

C1.1.1 Substitution with a Safer Alternative

Is substitution with a safer alternative practical, by for example, replacement of a clinical strain or pathogen with one that is lab adapted? Provide reasons for your answer:

There is no danger associated with the two cell lines and FBS and they cannot be replaced.

C1.1.2 Isolation/Segregation

(i) Is/Are the laboratory(s) to be used for this work to be shared with other workers not directly involved in this activity?

Indicate in the adjacent box as No, Yes or Not Relevant (N/R)	Yes

If yes, provide details: The CL2 laboratories in the CBE are a multi user facilities and have shared users. Work will be carried out in the CBE Tissue Engineering Lab, T208 located in the Wolfson School. The BSC, incubator and pipettes will be shared with Husnah Hussein, Andrea Fotticchia, Dan Curry, Helen Jesson (PhD students), and any other authorised user. After cell culture, equipment is decontaminated according to standard operating procedures and aseptic techniques are used to minimise contamination.

(ii) Is access to the laboratory(s) to be used for this work restricted?

Indicate in the adjacent box as No, Yes or Not Relevant (N/R)	Yes

If yes, provide details: Access to CBE laboratories is restricted to authorised users only. Users undergo training in working in CL2 laboratories and training files for authorised personnel can be found in the CBE office.

The T208 laboratory is locked at all times on exit to ensure safe storage of biological agents and unauthorised entry. The CBE T208B Laboratory are locked at all times outside of normal working hours Keys to the laboratory are only issued to authorised users. Out of Hours/Lone working is logged and permitted subject to risk assessment.

C1.2 Controlling Exposure

C1.2.1 Are sharps (needles, blades, scissors, forceps, glass or capillary tubes) to be used at any stage during this activity?

Indicate in the adjacent box as No, Yes or Not Relevant (N/R)	Yes

If yes, list the sharps:

1. Glass Haemocytometer and glass slide
2. Forceps

If yes, justify there use – is there an alternative?

The haemocytometer is necessary to perform the manual cell count; the glass slide is an essential component, according to SOP033 "USE AND MAINTENANCE OF HAEMOCYTOMETER".

Forceps are used to handle the magnesium scaffolds.

If yes, describe their use and disposal: The haemocytometer will be cleaned and decontaminated with 70% IMS and reused. Reusable metal forceps are used to handle scaffolds. Forceps are washed in 70% ethanol after use and then autoclaved for decontamination.

If yes, describe any additional precautions employed to reduce risk: In case of glass breakage the correct standard operating procedure will be adopted and SOP038 "Biological Spill Response" will be used to correctly dispose of contaminated glass. Accident procedures for sharps and glass injuries are displayed in posters in all labs within the CBE CL2 laboratories.

C1.2.2 Containment and Ventilation

(i) Is the use of BSC required for the protection of the worker i.e. do the work procedures generate aerosols or splashes that pose a risk to workers?

Indicate in the adjacent box as No, Yes or Not Relevant (N/R)	Yes

If yes, specify the type(s) and when they will be used:
Class II Biological Safety Cabinets (BSCs) will be used to perform cell culture and all manipulations that may cause aerosols or splashes of biological material. Also to protect cells from contamination. BSCs will be operated according to the following SOPs:

SOP009 "Use and Maintenance of Herasafe KS Class II BSC"
SOP104 "Use and Maintenance of HERASAFE KS Class II re-circulating BSCs"

(ii) Are there any requirements for room ventilation e.g. negative pressure, temperature control?

Indicate in the adjacent box as No, Yes or Not Relevant (N/R)	No

If yes, specify:

C1.2.3 Transport and Storage within the laboratory

How and where are materials to be stored?
Cryovials will be stored in liquid nitrogen and training has been obtained for handling samples in liquid nitrogen. Samples will also be stored in a freezer (-80°c). Once cells are thawed, flasks of cells will be stored in an incubator at 37°C. Cell culture medium is stored in the fridge and other reagents such as trypsin are stored in the freezer (-20°C).

How will this material be transported within the laboratory e.g. between BSC and incubator? Detail the containment measures which will be used to prevent or contain accidental splashes or spills. Cells will be in sealed flasks and if transported between or within laboratories will be in a second sealed container to prevent accidental splashes or spills. Appropriate spill response procedures are documented in the following SOPs: SOP005, "Storage and Transport of Biological Material" SOP038, "Biological Spill Response"

C1.2.4 Local transport out of the laboratory

How will this material be transported on-site (e.g. research material between labs on campus or movement of waste containing viable agents e.g. to a remote autoclave? Detail the containment measures which will be used to prevent or contain accidental splashes or spills Transport of biological material will be done according to SOP005, Storage and Transport of Biological Material. Double containment procedures should be used, biological material will be sealed in a primary container inside sealed secondary container.

C1.2.5 Shipment of Biological Material

Will this material be shipped elsewhere in the UK or abroad?						
Indicate in the adjacent box as No, Yes or Not Relevant (N/R)						No
If yes, give details to support compliance to the relevant regulation (e.g. category of material, correct packaging instruction):						
Description of material to be shipped (*indicate in available boxes*). Is this:						
Category A		UN2814		UN2900		*Packaging instruction 602 or 620 must be followed*
Or?						
Category B		UN3373				*Packaging instruction 650 must be followed*
Or?						
Non-hazardous						*Should be packaged to protect sample*

C1.2.6 Receipt of material

If material will be received from other sites or organisations, what precautions are being taken to ensure that the material is shipped correctly? Material that is shipped from other sites or organisations will be the responsibility of the sender to ensure it is shipped correctly. The material will be received in accordance with SOP008 Receipt of Hazardous Biological Material.

C1.2.7 Centrifugation

(i) If material is to be centrifuged will sealed buckets and rotors be used?
Indicate in the adjacent box as No, Yes or Not Relevant (N/R) — Yes
(ii) Where will these rotors/buckets be opened? Sealed buckets will be opened on the bench top within CL2 laboratories, unless there is a spillage of hazardous material whereby sealed buckets will be opened within a biological safety cabinet.
(iii)Describe the procedures in place to deal with leaks and spillages in the centrifuge *Biological spill kits are available in the laboratory and there are posters to provide advice on spillages and reporting procedures.* Procedures to prevent, contain and respond to leakages and spillages in the centrifuge are detailed in the following SOPs: SOP128, "Use and Maintenance of Heraeus Centrifuge Biofuge Primo R" and SOP038, "Biological Spill Response.

C1.2.8 Incubators

If incubators are to be used, what type of incubator (e.g. shaking, static) is used and describe procedures to prevent and contain spillages. *A static bioreactor at 37°C and 5% CO_2* will be used, spillages will be dealt with according to SOP038 "Biological Spill Response" and specific SOPs for incubators will be adhered to for correct use and maintenance of incubators.

C1.2.9 Disinfection

Specify the type and concentration of disinfectants to be used: 1% virkon is the primary disinfectant, 70% IMS is used where the use of virkon is inappropriate such as on stainless steel surfaces.
Have these disinfectants been validated for use with the recipient biological material? Indicate in the adjacent box as No, Yes or Not Relevant (N/R) — Yes
If yes, describe the procedure: These disinfectants are well known to be effective disinfectants against a wide range of viruses, fungi and bacteria. For Hazard Group1 (or 2), it is sufficient to rely on data from the manufacturer, providing the recommended concentrations and contact times are used. Hence, Virkon (1 %) is used according to the guidelines outlined by the manufacturer and according to standard procedures detailed in the COP and the following SOP: SOP006, "Selection and Use of Virkon Disinfectant"

C1.2.10 Personal Protective Equipment (PPE)

(i) What type of lab coats will be worn and where will they be stored? Side fastening Howie type lab coats are worn. They are stored outside the laboratory in designated change room.

(ii) What type of gloves will be worn and where will they be stored? Disposable latex powder free, aloe vera nitrile gloves for sensitive skin will be worn at all times and are stored in designated change rooms. Cryogenic gloves will be used when handling liquid nitrogen, and they are stored in the autoclave room in CBE laboratories. Heat resistance gloves will used handle objects from the autoclave and are stored autoclave room, CBE laboratories. SOP037 "Use of Personal Protective Equipment" will be followed for guidance on the correct use of PPE.
(iii) Describe any other PPE to be used: Safety glasses will be worn to protect the eyes and face shields will be worn when dealing with the liquid nitrogen stores. Shoe covers are worn at all times within the CBE CL2 laboratories. Heat resistant apron when handling objects from the autoclave. Correct use of PPE will be used with guidance from SOP037 "Use of Personal Protective Equipment".

C1.2.11 Hygiene Measures

Describe the hygiene facilities available and where they are located Hand wash facilities and eye wash stations are available in the change rooms of the CL2 laboratories.

C1.2.12 Vaccination

Are effective vaccines available against any of the agents listed in Section1, 2, 3, or 4 of Part B?	
Indicate in the adjacent box as No, Yes or Not Relevant (N/R)	N/R
If yes, describe:	

C1.2.13 Waste Treatment before Disposal

How must waste to be treated before disposal and how has it been validated as being effective?

Type of Waste	Treatment before disposal	Validation of this treatment
Liquid waste	Virkon sterilisation (SOP003 – Disposal of biological waste)	According to manufacturer's instructions; see section C2.1.9
Solid waste	Autoclave sterilization (SOP003 – disposal and disinfection of biological waste)	*Treatment cycle validated according to SOP054 (T208B Lab), SOP024 and SOP025, "Use and Maintenance of the Systec VX95 Autoclave"; No CBE044 and No CBE045 in CBE Lab Unit.*

C1.2.14 Autoclave sterilisation

If waste is treated by autoclave sterilisation then this section must be completed. If this section is not relevant then hatch the box

Type of Waste	Composition of waste	Autoclave cycle (temp, cycle time)	Treatment monitor
Liquid waste	N/R	N/R	N/R
Solid waste	Cell culture consumables	Cycle 4 for solid waste at 121°C for 15 minutes	Designated autoclave tape monitors

Location of autoclave	Servicing details	Location of back-up autoclave	Designated area for storage of unsterilised waste
Wolfson, located in the T208B lab.	Annual	CBE, autoclave Room (H31)	In designated area within the T208B lab.

C1.2.15 Liquid Waste Disposal

How will liquid waste be disposed of?
To the drain? Yes: The waste is disinfected by using 1% Virkon and disposed of down the drain with copious amounts of water in accordance with SOP003-– " Disposal of Healthcare waste"
As solid waste? No
Other? N/R

C1.2.16 Solid Waste Disposal

Describe the waste category and disposal route. *(For guidance refer* to http://www.environment-agency.gov.uk)

Colour Code	Categorisation	*Hatch relevant box(es)*	Disposal Method
Yellow	Sharps (not contaminated with cytotoxic/cytostatic material)		Yellow Sharps bin>autoclave sterilisation if known or potentially infected >clinical waste disposal (incineration)
Purple/Yellow Special case, contact DSO	Sharps (contaminated with cytotoxic/cytostatic material)		Purple/Yellow lidded Sharps bin>clinical waste disposal (incineration @ 1000C)
Yellow	Human body parts, organs, including blood bags and blood preserves and excreta (unless identified as medium or high risk or known infected in Section 2.2.1 of this RA in which case they must be pre-treated before disposal)		Yellow rigid one way sealed tissue bins>clinical waste disposal (incineration)
Yellow	Animal body carcasses or recognisable parts ((unless identified as medium or high risk or known infected in Section 2.2.1 of this RA in which case they must be pre-treated before disposal		Yellow rigid one way sealed tissue bins > clinical waste disposal (incineration)
Special Case – Contact DSO	Potentially or known infected lab wastes (including sharps) of HG2, GM Class 2, DEFRA Cat 2 or higher, that have not been pre-treated before leaving the site.		This is not a route of preference and is subject to special requirements
Orange	Infected or potentially infected lab wastes that have been pre treated before leaving the site		Disinfection or sterilisation (as identified in C1.2.14) in the laboratory suite > orange clinical waste bags > clinical waste disposal (incineration)

Yellow	Infected or potentially infected animal or human body parts, organs or excreta that have been pre treated before leaving site		Disinfection or sterilisation (as identified in C1.2.14) in the laboratory suite > yellow one way sealed tissue bins > clinical waste disposal (incineration)

C1.2.17 Work with Animals or Vectors (if none proceed to Section C1.2.18)

(i) Are animals or vectors to be infected with any of these biological agents?	
Indicate in the adjacent box as No, Yes or Not Relevant (N/R)	N/R
If yes, describe the procedure and describe where this aspect of the work will be conducted:	
(ii) Is shedding of infectious materials by the infected animals possible or expected?	
Indicate in the adjacent box as No, Yes or Not Relevant (N/R)	N/R
If yes, describe the routes of shedding, risk periods for such shedding and the additional precautions required to control exposure:	
(iii) Who will perform the inoculations of animals/vectors? What training have they received?	
Indicate in the adjacent box if Not Relevant (N/R)	N/R
Provide details of the training required:	

C1.2.18 Bioreactor/Fermenters (if none proceed to Section C1.2.19)

Will a bioreactor/fermenter be used to culture a biological agent?	
Indicate in the adjacent box as No, Yes or Not Relevant (N/R)	N/R
If yes, describe the size, and type of the bioreactor/fermenter.	
(ii) Are any supplementary containment measures required, for example, the use of a BSC or spill tray.	
Indicate in the adjacent box as No, Yes or Not Relevant (N/R)	N/R
If yes, describe:	

C1.2.19 Other Control Measures Required?

N/R

C1.3 Emergency Procedures

C1.3.1 Describe the procedures in place for dealing with spillages *(specify disinfectants and any special containment for large volumes)*

Within the BSC:
Procedures for dealing with small and large spillages are detailed in the following SOPs:

1) SOP006, "Selection and use of Virkon Disinfectant"
2) SOP104 "USE AND MAINTENANCE OF HERASAFE KS CLASS II RE-CIRCULATING BIOLOGICAL SAFETY CABINETS".
3) SOP038, "Biological Spill Response"

Labelled Biological Spill kits are located in each laboratory within the CBE and T208B. Posters are placed in the laboratories to enable workers to locate to the nearest biological (and chemical) spill kits. Posters displayed near BSCs to advise on spill response and reporting of spills within the BSC.

Within the laboratory but outside the control measure e.g. BSC, spill tray
For dealing with small and large spillages, procedures are detailed in the following SOPs:

1) SOP006, "Selection and use of Virkon Disinfectant"
2) SOP038, "Biological Spill Response"

Labelled Biological Spill kits are located in each laboratory within the CBE and T208B in the Wolfson School. Posters are placed in the laboratories to enable workers to locate the nearest biological (and chemical) spill kits. Posters displayed near BSCs to advise on spill response and reporting of spills within the BSC.

Outside the laboratory e.g. during transport

For transport outside the laboratory, the local code of practice will be followed and also SOP005 "Storage and Transport of Biological Agents" will be followed. Biological materials are transported outside the laboratory in a primary sealed container which will be sealed within a secondary sealed container.
Procedures for dealing with small or large spillages are in place and SOP038, "Biological Spill Response" will be followed.

Describe the procedures in place for an accidental exposure (if necessary describe different procedures for different types of exposure e.g. eye splash or percutaneous inoculation.

1. Procedures to respond to accidental exposure are detailed in SOP038, "Biological Spill Response" and the local COP. These are detailed in spill response posters located in each laboratory within CBE and T208B in the Wolfson School. Accident procedures in the case of glass or sharps injury are described in the local COP and displayed in posters located in the CBE and T208B laboratories.
2. Designated hand washing facilities are located in each laboratory change room within CBE and T208B in the Wolfson School.
3. Eye Wash stations are located next to the 'hand washing only' sink in the laboratory change rooms.
4. A First Aid Kit is located in the change room of the T208B Lab. Signs are posted to enable workers to locate the nearest Medical Kit. Contact details for First Aiders are posted in each laboratory.
5. Essential and Emergency Contact details are posted in the CBE and T208B laboratories.

C2 ASSIGNMENT OF CONTAINMENT LEVEL

The laboratory Containment Level is directly related to each of the 4 Hazard Groups; organisms categorised as HG1 (lowest hazard rating) should normally be handled in CL1 facilities (minimum level of containment), and likewise up to HG4 (highest hazard rating) in CL4 facilities (maximum level of containment). Where the identity or presence of a biological agent is not known the following rules apply: a) where uncertainty exists over the presence of pathogenic biological agent – minimum of CL2; b) where the presence of a pathogenic biological agent is known or suspected – minimum of Containment Level appropriate to the agent, where the assessment is inconclusive but where the activity might involve serious risk – minimum CL3

C2.1. What containment level is required for this work? (see COSHH Schedule 3, Part II for a list of criteria)

The laboratories that will be used are Containment level 2 laboratories. The work to be carried out is hazard group 1 which requires containment level 1. Work will be carried out at Containment Level 2 for reasons other than worker protection; this includes the need to ensure research material protection (e.g. the use of a class II safety cabinet) and to impose a quality assurance discipline.

C2.2. Describe extra controls or derogation from certain controls
:

N/R

C3 FACILITIES

C3.1 Where will this work take place?

Room(s)	Building	Campus	Person in Control of area
CBE Tissue Engineering Lab T208B	Wolfson T building	Loughborough University	Robert Temple (DSO) Carolyn Kavanagh (Lab Manager) Kul Sikand (Lab Manager)

C4 PERSONNEL

C4.1 Names of Personnel involved in the Project

Surname	Initials	University ID	Position
Liu	H	5024136	Academic visitor
Liu	Y		Supervisor

C4.2 Information, Instruction and Training

Describe the training that will be given to all those affected (directly or indirectly) by the work activity. Instruction should include the 'Local Rules' or 'Local Codes of Practice' which focus on the working instructions to be followed by all persons involved in the work activity to control or prevent exposure to hazardous biological agent(s). These should be written and readily available to all workers working at Containment Level 2. A formal record of training should be kept for all individuals working at Containment Level 2.

Personnel are trained according to the local Code of Practice. Prior to authorisation, lab users must complete a training file and obtain the minimum training required by the CBE management and health and safety committee. Individuals involved in the work activity are trained in all procedures and equipment required for the work to be carried out. Training files are ongoing documents that are kept in the CBE office and it is the responsibility of the lab user to identify any further training required to proceed with the project.

For this project, H. Liu will partake in practical aspects of this project and Y. Liu will be the supervisor.

C4.3 Relevant Experience/Training:

Surname	Experience/Training
Liu	*Cell culture techniques, CBE training as documented in the CBE Permit to Work (CBE/PW2)*

C4.4 Other people who may be at risk from the activity e.g. cleaners, maintenance workers or other workers in shared laboratory

Two laboratory shut downs occur every year for ~ week for maintenance work to be done in the CBE Laboratories. Prior to these shut down weeks, a full deep clean decontamination will be performed in all laboratory areas.

All other workers in the CBE Laboratories are authorised personnel.

C5 OCCUPATIONAL HEALTH

C5.1 Vaccination

Is an effective vaccination available for any of the pathogens associated with this work? Advice can be obtained from the Occupational Health Adviser (OHA) if required. All workers involved with handling unscreened blood, blood products and other tissues are recommended to have Hepatitis B immunization

C5.2 Health Surveillance

Is health surveillance required? (Health surveillance is typically applied if working with a hazardous substance that:

a) produces an identifiable disease or adverse health effect that can be related to exposure; b) there is a reasonable likelihood that the disease or effect may occur under the conditions of work, and c) there are valid techniques for detecting indications of the disease or effect). DM vaccinated against hepatitis B (2013), blood test required to check immunity.

C6. NOTIFICATIONS: Human Tissue Act

C6.1.1 Relevant material covered by the Human Tissue Act

Are any of the cells, tissues or fluids to be used covered by the Human Tissue Act?	
Indicate in the adjacent box as No, Yes or Not Relevant (N/R)	No

C6.1.2 Does This Work Have Ethical Approval? If Yes, Provide Details

Indicate in the adjacent box as No, Yes or Not Relevant (N/R)			N/R
Approval number:			
Date obtained:		Ethics committee name:	

C6.1.3 Are other registrations/notifications required for this work? For example HSE notification under COSHH, Home Office notification under anti-terrorism, crime and security act etc

Indicate in the adjacent box as No, Yes or Not Relevant (N/R)	No
If Yes, give details:	

7. LICENSING REQUIREMENTS FOR ANIMAL PRODUCTS

C7.1.1 Are there any licensing requirements for this work?

Indicate in the adjacent box as No, Yes or Not Relevant (N/R)	N/R

The regulations covering the import of animal products (including tissue cultures, tissues, body fluids or fractions thereof) are in a state of flux. Current procedures to be followed:

- If you wish to import any animal products that you know are not infected with an animal pathogen, or have good reason to expect that they are not infected with an animal pathogen, from within or outside of the EC you must apply for a Research Sample Licence using the Defra form IAPPO1. Follow this link to download the form http://www.defra.gov.uk/corporate/docs/forms/ahealth/iapppo1.htm

- If you wish to import such an animal product but it is known or suspected of being infected with an animal pathogen then you must use DEFRA form IM137. Follow this link to download the form http://www.defra.gov.uk/corporate/docs/forms/ahealth/inttrade/im137.htm

- If you wish to import an animal pathogen listed under the Specified Animal Pathogens Order then you must use DEFRA form PATH1. Follow this link to download the form http://www.defra.gov.uk/corporate/docs/forms/ahealth/path1.htm

In all cases the instructions for their submission is stated on the forms themselves.

ALL APPLICATIONS SHOULD BE REVIEWED BY THE DEPARTMENTAL SAFETY OFFICER AND THE UNIVERSITY BIOLOGICAL SAFETY OFFICER BEFORE SUBMISSION.

8. DECLARATION

*The declaration must be signed **before** submitting this assessment to the Departmental Safety Officer and University Biological Safety Officer*

I, the undersigned:

- confirm that all information contained in this assessment is correct and up to date
- will ensure that **suitable and sufficient instruction, information and supervision** is provided for all individuals working on the activity
- will ensure that no work will be carried out until this **assessment has been completed and approved** and that all necessary control measures are in place
- that all information contained in this assessment must remain correct and up to date (the assessment should be **reviewed once a year** and whenever any **significant changes** to the work activity occur)
- will re-submit the assessment for approval if any significant changes occur

Name: Person conducting assessment	**Signature:**	**Date:**
H. Liu		
Name(s): All named persons involved in the project *(add additional rows below, as required)*	**Signature:**	**Date:**
Name: Principal Investigator/Supervisor/Line Manager	**Signature:**	**Date:**
Y. Liu		

9.APPROVAL

For work involving **Hazard Group 1** biological agents: Review and approval is required by authorised and designated members of CBE staff before the work begins

For work with **Hazard Group 2** biological agents: Explicit approval is required from the Departmental Biological Safety Advisor and the University Biological Safety Officer before work begins.

If the biological agent has been **Genetically Modified** this form, (approved by the relevant authority, as above) should be submitted with the GMO risk assessment to the Departmental Biological Safety Advisor and both forms forwarded to the LU GM Safety Committee for final approval.

Name: Authorised CBE Personnel (please indicate position)	**Signature**	**Date**
A. Chandra **Research Associate**	A. Chandra	28 Nov 2014
Name: Departmental Biological Safety Advisor	**Signature**	**Date**
Name: University Biological Safety Officer (or Deputy)	**Signature**	**Date**