The University *of* Western Ontario
BIOLOGICAL AGENTS REGISTRY FORM
Approved Biohazards Subcommittee: October 14, 2011
Biosafety Website: www.uwo.ca/humanresources/biosafety/

This form must be completed by each Principal Investigator holding a grant administered by the University of Western Ontario (UWO) or in charge of a laboratory/facility where the use of Level 1, 2 or 3 biological agents is described in the laboratory or animal work proposed. The form must also be completed if any work is proposed involving animals carrying zoonotic agents infectious to humans or involving plants, fungi, or insects that require Public Health Agency of Canada (PHAC) or Canadian Food Inspection Agency (CFIA) permits.

This form must be updated at least every 3 years or when there are changes to the biological agents being used.

Containment Levels will be established in accordance with Laboratory Biosafety Guidelines, 3rd edition, 2004, Public Health Agency of Canada (PHAC) or Containment Standards for Veterinary Facilities, 1st edition 1996, Canadian Food Inspection Agency (CFIA).

Electronically completed forms are to be submitted to Occupational Health and Safety, (OHS), (Support Services Building, Room 4190 or to jstanle2@uwo.ca) for distribution to the Biohazards Subcommittee. For questions regarding this form, please contact the Biosafety Officer at extension 81135 or biosafety@uwo.ca. If there are changes to the information on this form (excluding grant title and funding agencies), contact Occupational Health and Safety for a modification form. See website: www.uwo.ca/humanresources/biosafety.

Please ensure that all questions are fully and clearly answered. Failure to do so will lead to the form being returned, which will cause delays in your approval and frustration for you and your colleagues on the Committee.

If you are re-submitting this form as requested by the Biohazards Subcommittee, please make modifications to the form in bold print, highlighted in yellow. Please re-submit forms electronically.

PRINCIPAL INVESTIGATOR:	**Dean H. Betts**
DEPARTMENT:	**Physiology and Pharmacology**
ADDRESS:	**Dental Sciences Building (DSB) 2022**
PHONE NUMBER:	**519-661-2111 ext. 83786**
EMERGENCY PHONE NUMBER(S):	**(c) 519-670-8978; (h) 519-204-3451**
EMAIL:	**dean.betts@schulich.uwo.ca**

Location of experimental work to be carried out :

Building :	**DSB 2019**	Room(s):	**DSB 2025**
Building :	**DSB 2019A**	Room(s):	**DSB 2025A**
Building :	**DSB 2019B**	Room(s):	

***For work being performed at Institutions affiliated with the University of Western Ontario, the Safety Officer for the Institution where experiments will take place must sign the form prior to its being sent to the University of Western Ontario Biosafety Officer (See Section 15.0, Approvals).**

FUNDING AGENCY/AGENCIES: **CIHR, NSERC, CHRI/Lawson, UWO internal funds, Stem Cell Network**

GRANT TITLE(S): **Extra-telomeric functions of telomerase reverse transcriptase (TERT) isoforms**
Redox regulation of canine embryonic stem cells

UNDERGRADUATE COURSE NAME(IF APPLICABLE):

List all personnel working under Principal Investigators supervision in this location:

Name	UWO E-mail Address	Date of Biosafety Training
Jonathan Teichroeb	**jhteichr@gmail.com**	**26-Sep-2012**
Ian Tobias	**itobias@uwo.ca**	**01-Oct-2012**
Courtney Brooks	**cbrook8@uwo.ca**	**07-Sep-2012**

Please explain how the biological agents are used in your project and how they are stored and disposed of. The BARF without this description will not be reviewed.

In our research projects we transfect/transduced our canine/human embryonic stem cells with various DNA vectors and/or RNA molecules to conduct various gain-of-function and loss-of-function analyses. Embryonic stem cells are cultured with/without mouse embryonic fibroblasts (MEF) feeder cells in humifidied incubators and passage propagated within biosafety cabinets located in level 2 designated cell culture facilities (DSB 2019A/B and DSB 2025A). All cells are cryostored in liquid nitrogen tanks and are pocessed by either cell lysis or fixation after DNA/RNA transfections/transductions and subsequent culture treatments for all molecular/biochemical assays utilized in the lab. Any remaining or unused live biological waste material is disinfected and placed into biohazard labelled autoclave bags for regular hazardous waste pick-ups for autoclaving prior to disposal.

Please include a ONE page research summary or teaching protocol in lay terms.
Forms with summaries more than one page will not be reviewed.

Extra-Telomeric Functions of Telomerase Reverse Transcriptase (TERT) Isoforms

Currently, over 14% of Canada's population is over age 65 and by 2026, one in five Canadians will be over age 65. With this senior population increase there will be an affiliated rise in age-related diseases and injuries along with their associated economic impact on our health care system. Along with promoting healthy living and improving health policies and systems affecting life and health, we need to focus on advancing our knowledge with respect to tissue repair and regeneration to help prevent/treat various diseases and injuries that disable a growing number of aging Canadians. Stem cells exist in most mammalian organs and tissues and are essential for normal tissue function and repair. The aging process coincides with a reduction in the regenerative ability of various tissues and a decline in stem cell function. It is now generally accepted that stem cell functionality limits organ homeostasis and repair, but emerging work suggests they also fuel tumour growth. We have discovered novel and existing forms of the telomerase reverse transcriptase (TERT) enzyme that are more highly expressed in conditions that maintain stem cell function. These roles of telomerase appear to be not associated with it's known activity in synthesizing the ends of chromosomes (telomeres). We hypothesize that telomerase isoforms promote stem cell function by extra-telomeric means. This research project will clarify the non-telomeric roles of TERT isoforms in maintaining stem cell function. We aim to discover novel TERT targets that maintain/induce stem cell behavior. Our findings will open up opportunities for drug discovery and strategies to identify compounds that can be used to manipulate stem cells for therapeutic purposes to enhance tissue regeneration and repair and to treat age-related diseases such as cancer.

Redox Regulation of Canine Embryonic Stem Cells

Stem cells are characterized by their capacity for prolong cell division and their ability to differentiate into multiple cell types. As such, stem cells help preserve tissue functions throughout life. Aerobic metabolism, while enabling efficient energy production, also generates reactive oxygen species (ROS). Stem cell biology has primarily focused on the harmful effects of ROS, which include cell/tissue aging, cancer development and activation of anti-stress repair mechanisms. In contrast, exciting new data that we have contributed to generating, indicates that the characteristic traits of stem cells are in fact regulated by ROS. My NSERC funded research program (continuously since 2001) has resulted in the novel development of several canine embryonic stem cell (cESC) lines. Interestingly, our cESCs appear to require both leukemia inhibitory factor (LIF) and basic fibroblast growth factor (bFGF) in their culture medium to survive, proliferate and maintain their stem cell characteristics - unlike mouse or human ESCs, which solely require LIF or bFGF, respectively. The next critical step in characterizing these novel canine stem cells is to understand how ROS govern their stem cell attributes. Using canine embryonic stem cell culture models that mimic physiological low and high oxidative conditions, we will characterize the redox status and signaling pathways that control canine embryonic stem cell division in the undifferentiated state. Using a novel protein separation technique, we will determine the spectrum of disulfide-linked proteins that are affected by increased ROS levels and by modulating the levels of ROS aim to increase the efficiency of producing induced pluripotent stem cells from canine fibroblasts. Identification and analysis of ROS sensing proteins will provide insight into how oxidative cellular conditions influence stem cell functions. Support for these studies will place Canada in the forefront of these emerging biotechnologies, providing high-tech training for numerous highly qualified personnel (HQP) while enhancing the biomedical and commercial potential for implementing stem cell therapies in the dog.

1.0 Microorganisms

1.1 Does your work involve the use of biological agents? ☒ YES ☐ NO
(non-pathogenic and pathogenic biological agents including but not limited to bacteria and other microorganisms, viruses, prions, parasites or pathogens of plant or animal origin)? If no, please proceed to Section 2.0

Do you use microorganisms that require a permit from the CFIA? ☐ YES ☒ NO
If YES, please give the name of the species ____________________
What is the origin of the microorganism(s)? ____________________

Please describe the risk (if any) of escape and how this will be mitigated:
LOW/NO RISK. In event of a biological agent release we will place paper towel/absorbent on liquid; pour a strong disinfectant solution (i.e. 10% bleach) around, but not on the spill, mix the disinfectant with the spilled material cautiously; evacuate the laboratory for a time sufficient for decontamination of the mixed material (~ 20 min.); place paper into bag for incineration; decontaminate with disinfectant all surfaces exposed to spill.

Please attach the CFIA permit.

Please describe any CFIA permit conditions:
N/A

1.2 Please complete the table below:

Full Scientific Name of Biological Agent(s)* (Be specific)	Is it known to be a human pathogen? YES/NO	Is it known to be an animal pathogen? YES/NO	Is it known to be a zoonotic agent? YES/NO	Maximum quantity to be cultured at one time? (in Litres)	Source/ Supplier	PHAC or CFIA Containment Level
	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No			☐ 1 ☐ 2 ☐ 2+ ☐ 3
CytoTune®-iPS Sendai Reprogramming Kit	☐ Yes ☒ No	☒ Yes ☐ No	☐ Yes ☒ No	**3 x 106 CIU each or ~ 0.000025 L**	**Life Technologies**	☐ 1 ☒ 2 ☐ 2+ ☐ 3
E.Coli (DH10B, DH5A, TOP10, OMNI-MAX)	☐ Yes ☒ No	☐ Yes ☒ No	☐ Yes ☒ No	**500mL**	**Life Technologies**	☐ 1 ☒ 2 ☐ 2+ ☐ 3
	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No			☐ 1 ☐ 2 ☐ 2+ ☐ 3
	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No			☐ 1 ☐ 2 ☐ 2+ ☐ 3
	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No			☐ 1 ☐ 2 ☐ 2+ ☐ 3
	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No			☐ 1 ☐ 2 ☐ 2+ ☐ 3
	☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No			☐ 1 ☐ 2 ☐ 2+ ☐ 3

Please attach a Material Safety Data Sheet or equivalent from the supplier if the bacterium used is not on this link:
http://www.uwo.ca/humanresources/docandform/docs/ohs/CFIA_Ecoli_list.pdf

Additional Comments: **see attached documentation**

2.0 Cell Culture

2.1 Does your work involve the use of cell cultures? ☒ YES ☐ NO
(If NO, please proceed to Section 3.0)

2.2 Please indicate the type of primary cells (i.e. derived from fresh tissue) that will be grown in culture:

Cell Type	Is this cell type used in your work?	Source of Primary Cell Culture Tissue	AUS Protocol Number
Human	☐ Yes ☐ No		Not applicable
Rodent	☐ Yes ☐ No		
Non-human primate	☐ Yes ☐ No		
Other (specify)	☐ Yes ☐ No		

2.3 Please indicate the type of established cells that will be grown in culture in:

Cell Type	Is this cell type used in your work?	Specific cell line(s)*	Containment Level of each cell line	Supplier / Source of cell line(s)
Human	☒ Yes ☐ No	**Human Embryonic Stem Cells (H9)**	**2**	**- WiCell - see SCOC letter**
Rodent	☒ Yes ☐ No	**mouse embryonic fibroblasts (MEFs)**	**2**	**SickKids / GlobalStem**
Non-human primate	☐ Yes ☐ No			
Other (specify)	☐ Yes ☐ No			

Please attach a Material Safety Data Sheet or equivalent from the supplier. (For more information, see www.atcc.org)

2.4 For above named cell types(s) indicate PHAC or CFIA containment level required ☐ 1 ☒ 2 ☐ 2+ ☐ 3

Additional Comments: _____

3.0 Use of Human Source Materials

3.1 Does your work involve the use of human source materials? ☐ YES ☒ NO
If no, please proceed to Section 4.0

3.2 Indicate in the table below the Human Source Material to be used.

Human Source Material	**Source/Supplier /Company Name**	**Is Human Source Material Infected With An Infectious Agent? YES/UNKNOWN**	**Name of Infectious Agent (If applicable)**	**PHAC or CFIA Containment Level (Select one)**
Human Blood (whole) or other Body Fluid		☐ Yes ☐ Unknown		☐1 ☐2 ☐2+ ☐3
Human Blood (fraction) or other Body Fluid		☐ Yes ☐ Unknown		☐1 ☐2 ☐2+ ☐3
Human Organs or Tissues (unpreserved)		☐ Yes ☐ Unknown		☐1 ☐2 ☐2+ ☐3
Human Organs or Tissues (preserved)		Not Applicable		Not Applicable

Additional Comments: _____

4.0 Genetically Modified Organisms and Cell lines

4.1 Will genetic modifications be made to the microorganisms, biological agents, or cells described in Sections 1.0 and 2.0? ☒ YES ☐ NO If **NO**, please proceed to Section 5.0

4.2 Will genetic modification(s) involving plasmids be done? ☒ YES, complete table below ☐ NO

Bacteria Used for Cloning *	Plasmid(s) **	Source of Plasmid	Gene Transformed or Transfected	Will there be a change due to transformation of the bacteria?	Will there be a change in the pathogenicity of the bacteria after the genetic modification?	What are the consequences due to the transformation of the bacteria?
E. coli DH5alpha, DH10beta, TOP10, OMNI-MAX	**pcDNA3.1his p66Shc**	**addgene.org**	**p66Shc**	**no**	**no**	**none**
	pcDNA3.1his p66Shc S36A	**addgene.org**	**mutant p66Shc**	**no**	**no**	**none**
	pCAGTetRnls	**addgene.org**	**tetracycline (TET) repressor**	**no**	**no**	**None**
	pSuperior			**no**	**no**	**none**
	transposase pB-TET rtTA plasmid					
	pCR2.1					

**** Please attach a Material Safety Data Sheet or equivalent if available.***
***** Please attach a plasmid map.***
******No Material Safety Data Sheet is required for the following strains of E. coli:***
http://www.uwo.ca/humanresources/docandform/docs/ohs/CFIA_Ecoli_list.pdf

4.3 Will genetic modification(s) of bacteria and/or cells involving viral vectors be made?
☒ YES, complete table below ☐ NO

Virus Used for Vector Construction	Vector(s) *	Source of Vector	Gene(s) Transduced	Describe the change that results from transduction
Sendai	**Sendai vectors**	**Life Technologies**	**hOct3/4, hSox2, hKlf4, hc-Myc**	**none, no plasmid map provided by vendor; non-integrating vector**

**** Please attach a Material Safety Data Sheet or equivalent.***

4.3.1 Will virus be replication defective? ☒ YES ☐ NO

4.3.2 Will virus be infectious to humans or animals? ☐ YES ☒ NO

4.3.3 Will this be expected to increase the containment level required? ☐ YES ☒ NO

5.0 Will genetic sequences from the following be involved?

- HIV ☒ NO ☐ YES, specify
- HTLV 1 or 2 or genes from any Level 1 or Level 2 pathogens ☒ NO ☐ YES, specify
- SV 40 Large T antigen ☒ NO ☐ YES
- E1A oncogene ☒ NO ☐ YES
- Known oncogenes ☐ NO ☒ YES, specify **c-Myc**
- Other human or animal pathogen and or their toxins ☒ NO ☐ YES, specify

5.1 Is any work being conducted with prions or prion sequences? ☒ NO ☐ YES

Additional Comments: _____

6.0 Human Gene Therapy Trials

6.1 Will human clinical trials be conducted involving a biological agent? ☐ YES ☒ NO
(including but not limited to microorganisms, viruses, prions, parasites or pathogens of plant or animal origin)
If no, please proceed to Section 7.0

6.2 If YES, please specify which biological agent will be used:
Please attach a full description of the biological agent.

6.3 Will the biological agent be able to replicate in the host? ☐ YES ☐ NO

6.4 How will the biological agent be administered?

6.5 Please give the Health Care Facility where the clinical trial will be conducted:

6.6 Has human ethics approval been obtained? ☐ YES, number: ☐ NO ☐ PENDING

7.0 Animal Experiments

7.1 Will live animals be used? ☐ YES ☒ NO If **NO**, please proceed to section 8.0

7.2 Name of animal species to be used

7.3 AUS protocol #

7.4 List the location(s) for the animal experimentation and housing.

7.5 Will any of the agents listed in section 4.0 be used in live animals
☐ NO ☐ YES, specify:

7.6 Will the agent(s) be shed by the animal:
☐ YES ☐ NO, please justify:

8.0 Use of Animal species with Zoonotic Hazards

8.1 Will any animals with zoonotic hazards or their organs, tissues, lavages or other body fluids including blood be used (see list below)? ☐ YES ☒ NO - If **NO**, please proceed to section 9.0

8.2 Will live animals be used? ☐ YES ☐ NO

8.3 If **YES**, please specify the animal(s) used:

♦ Pound source dogs	☐ YES	☐ NO
♦ Pound source cats	☐ YES	☐ NO
♦ Cattle, sheep or goats	☐ YES, species	☐ NO
♦ Non-human primates	☐ YES, species	☐ NO
♦ Wild caught animals	☐ YES, species & colony #	☐ NO
♦ Birds	☐ YES, species	☐ NO
♦ Others (wild or domestic)	☐ YES, specify	☐ NO

8.4 If no live animals are used, please specify the source of the specimens:

9.0 Biological Toxins and Hormones

9.1 Will toxins or hormones of biological origin be used? ☐ YES ☒ NO If **NO**, please proceed to Section 10.0

9.2 If YES, please name the toxin(s) or hormones(s)
Please attach information, such as a Material Safety Data Sheet, for the toxin(s) used.

9.3 What is the LD_{50} (specify species) of the toxin or hormone

9.4 How much of the toxin or hormone is handled at one time*?

9.5 How much of the toxin or hormone is stored*?

9.6 Will any biological toxins or hormones be used in live animals? ☐ YES ☐ NO
If **YES**, Please provide details:

*For information on biosecurity requirements, please see:
http://www.uwo.ca/humanresources/docandform/docs/healthandsafety/biosafety/Biosecurity_Requirements.pdf

Additional Comments: _____

10.0 Insects

10.1 Do you use insects? ☐ YES ☒ NO - If **NO**, please proceed to Section 11.0

10.2 If YES, please give the name of the species.

10.3 What is the origin of the insect?

10.4 What is the life stage of the insect?

10.5 What is your intention? ☐ Initiate and maintain colony, give location:
☐ "One-time" use, give location:

10.6 Please describe the risk (if any) of escape and how this will be mitigated:

10.7 Do you use insects that require a permit from the CFIA permit? ☐ YES ☐ NO
If **YES**, Please attach the CFIA permit & describe any CFIA permit conditions:

11.0 Plants

11.1 Do you use plants? ☐ YES ☒ NO - If **NO**, please proceed to Section 12.0

11.2 If YES, please give the name of the species.

11.3 What is the origin of the plant?

11.4 What is the form of the plant (seed, seedling, plant, tree…)?

11.5 What is your intention? ☐ Grow and maintain a crop ☐ "One-time" use

11.6 Do you do any modifications to the plant? ☐ YES ☐ NO
If yes, please describe:

11.7 Please describe the risk (if any) of loss of the material from the lab and how this will be mitigated:

11.8 Is the CFIA permit attached? ☐ YES ☐ NO
If **YES**, Please attach the CFIA permit & describe any CFIA permit conditions:

12.0 Import Requirements

12.1 Will any of the above agents be imported? ☐ YES, country of origin ☒ NO
If **NO**, please proceed to Section 13.0

12.2 Has an Import Permit been obtained from HC for human pathogens? ☐ YES ☐ NO

12.3 Has an import permit been obtained from CFIA for animal or plant pathogens? ☐ YES ☐ NO

12.4 Has the import permit been sent to OHS? ☐ YES, please provide permit # ☐ NO

13.0 Training Requirements for Personnel Named on Form

All personnel named on the above form who will be using any of the above named agents are required to attend the following training courses given by OHS:

- Biosafety
- Laboratory and Environmental/Waste Management Safety
- WHMIS (Western or equivalent)
- Employee Health and Safety Orientation

As the Principal Investigator, I have ensured that all of the personnel named on the form who will be using any of the biological agents in Sections 1.0 to 9.0 have been trained.

An X in the check box indicates you agree with the above statement... ☒
Enter Your Name Dean H. Betts ***Date:*** January 7, 2013

14.0 Containment Levels

14.1 For the work described in sections 1.0 to 9.0, please indicate the highest HC or CFIA Containment Level required. ☐ 1 ☒ 2 ☐ 2+ ☐ 3

14.2 Has the facility been certified by OHS for this level of containment?
☒ YES, location and date of most recent biosafety inspection: **DSB 2019B, DSB 2025A; July 23, 2012**
☐ NO, please certify
☐ NOT REQUIRED for Level 1 containment

14.3 Please indicate permit number (not applicable for first time applicants): **BIO-UWO-0248**

15.0 Procedures to be Followed

15.1 Are additional risk reduction measures necessary beyond containment level 1, 2, 2+ or 3 measures that are unique to these agents? ☐ YES ☒ NO
If **YES** please describe:

15.2 Please outline what will be done if there is an exposure to the biological agents listed such as a needlestick injury or an accidental splash:

The exposed site is washed immediately and appropriately for type of exposure. If required, medical attention will be promptly attained bringing the Material Safety Data Sheet or equivalent. Spills, accidents or exposures to infectious materials and losses of containment will be reported immediately to the laboratory supervisor, who will complete, sign and submit a University accident report.

15.3 As the Principal Investigator, I will ensure that this project will follow the Western Biosafety Guidelines and Procedures Manual for Containment Level 1 & 2 Laboratories (and the Level 3 Facilities Manual for Level 3 projects). I will ensure that UWO faculty, staff and students working in my laboratory have an up-to-date Hazard Communication Form, found at http://www.shs.uwo.ca/workplace/workplacehealth.html

An X in the check box indicates you agree with the above statement... ☒
Enter Your Name **Dean H. Betts** ***Date:*** **January 7, 2013**

15.4 Additional Comments: _____

16.0 Approvals

1) UWO Biohazards Subcommittee:
SIGNATURE: _____
Date: _____

2) Safety Officer for the University of Western Ontario
SIGNATURE: _____
Date: _____

3) Safety Officer for Institution where experiments will take place (if not UWO):
SIGNATURE: _____
Date: _____

Approval Number: _____ Expiry Date (3 years from Approval): _____

Special Conditions of Approval:

Permit: BIO-UWO-0248
Permit Holder: Dean Betts

Plasmid 26599: pCAGTetRnls (addgene.org)

The pCAGTetRnls plasmid will be used as a TET (tetracycline) repressor to control the plasmid pSUPERIOR for inducible expression of shRNAs to create inducible knockdowns of various genes in in embryonic stem cells. All transfections of this agent into cells will be by non-viral (ie. electroporation, lipofectamine etc) means. The plasmid vial will be stored in the dedicated fridge/freezer located in DSB 2025A. This agent will be disposed by standard means for a level 2 biosafety culture facility.

More Info: Can be found on the addgene website (www.addgene.org) for Plasmid 26599 and on attached documents.

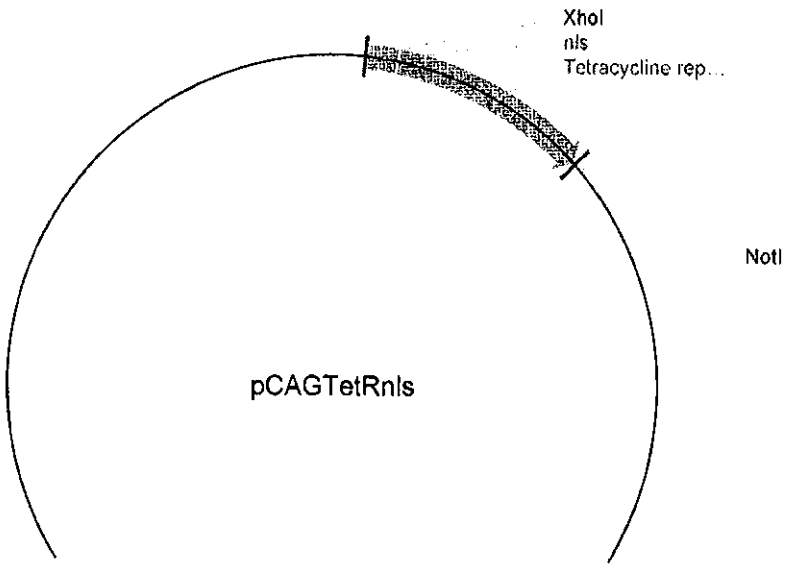
addgene
A better way to share plasmids

Browse > Peter Andrews > Zafarana et al > pCAGTetRnls

Plasmid 26599: pCAGTetRnls

Gene/insert name:	Tetracycline repressor
Alt name:	TetR
Insert size:	704
Species:	E.Coli
GenBank ID:	X00694
Entrez Gene:	TetR (IPF_209)
Fusion protein or tag:	nls
Terminal:	N terminal on insert
Vector backbone:	pCAG (Search Vector Database)
Vector type:	Mammalian Expression
Backbone size w/o insert:	6413
Cloning site 5':	XhoI
Site destroyed during cloning:	No
Cloning site 3':	NotI
Site destroyed during cloning:	No
5' sequencing primer:	n/a List of Sequencing Primers
3' sequencing primer:	n/a
Bacterial resistance:	Ampicillin
Growth strain:	DH5alpha
Growth temperature (°C):	37
High or low copy:	Low Copy
Selectable markers:	Puromycin
Sequence:	View sequences (2)
Map:	View map
Principal Investigator:	Peter Andrews
Terms and Licenses:	MTA

Addgene has sequenced a portion of this plasmid for verification. Click here for the sequencing result.


XhoI
nls
Tetracycline rep...
NotI
pCAGTetRnls

addgene

One Kendall Square
Suite B6302 Tel: 617-225-9000
Cambridge, MA 02139 Fax 888-734-0533

Shipper's Customs Declaration

Recipient:
Dean Betts
University of Western Ontario
Physiology and Pharmacology
London, ON N6A 5C1
CA
5196612111

2010-01-27

Dear Dean Betts/Customs Agent:

Please find enclosed: Cultures of non-hazardous, non-infectious E. coli micro-organism samples, for research use only.
HTS/HS/CN Code: 3002 90 51

These reagents have similar properties to the reagents described in *Redox regulation of forkhead proteins through a p66shc-dependent signaling pathway.* Nemoto S, Finkel T, Science. 2002 Mar 29. 295(5564):2450-2.; and several research publications.

The contents of the package are one or more tubes (5 cm tall x 2 cm diameter) of bacterial stabs at room temperature. They are vials of non-hazardous, non-infectious samples and do not require a permit to import. Not subject to IATA regulations or UPS-ISC Controls.

Customs Value: These goods are not for commercial use, cannot be resold (as stipulated by legal agreement), and are intended for research purposes only. As such the goods have been assigned a nominal value of $5 USD for customs purposes only.

Fair Market Value: These goods are provided by Addgene, a US non-profit organization, as a service to the academic research community, and may otherwise be obtained for free from National Heart, Lung, and Blood Institute (NHLBI) (US), and several research and academic institutions.

Please feel free to contact Addgene if you require further clarification of the contents from the sender.

Yours Sincerely,

Addgene
One Kendall Square
Cambridge MA 02139
USA

Page 3

addgene

Plasmid 10972: pcDNA3.1his p66shc

Gene/insert name:	p66shc
Insert size (bp):	Unknown
Gene/insert aliases:	SHC1, SHC, SHCA, FLJ26504
Species of gene(s):	H. sapiens (human)
Fusion proteins or tags:	His
Terminal:	N terminal on backbone
Vector backbone:	pcDNA3.1 His (Search Vector Database)
Backbone manufacturer:	Invitrogen
Type of vector:	Mammalian expression
Backbone size (bp):	5500
Cloning site 5':	EcoRI
Site destroyed during cloning:	No
Cloning site 3':	EcoRI
Site destroyed during cloning:	No
5' Sequencing primer:	T7 (List of Sequencing Primers)
3' Sequencing primer:	BGHrev
Bacteria resistance:	Ampicillin
High or low copy:	High Copy
Grow in standard E. coli @ 37C:	Yes
Selectable markers:	Neomycin
Sequence:	View sequence
Plasmid Provided In:	DH5a
Principal Investigator:	Toren Finkel
Terms and Licenses:	MTA

Addgene has sequenced a portion of this plasmid for verification. Click here for the sequencing result.

Click on map to enlarge

Add to Cart

Price: $65.00

Plasmid Links
Sequence
Reviews (0)
Related Plasmids
From this article
SHC1 plasmids
Toren Finkel Lab Plasmids
Other Links
NCBI: SHC1
SHC1 antibodies

This is commonly requested with
pcDNA3.1his p66shc S36A

Plasmid Cart
Your cart is empty.

Recently Viewed
pcDNA3.1his p66shc
Plasmid 10972
pcDNA3.1his p66s...
Plasmid 10973

Page 4

addgene

Login | New User

Search for Plasmids: Go

Advanced Search

Home | Deposit Plasmids | **Request Plasmids** | Plasmid Tools | About Addgene

Information | Browse | Search | Pricing | FAQ

Print Friendly | Email

Plasmid 10973: pcDNA3.1hls p66shc S36A

Gene/insert name:	p66shc
Insert size (bp):	Unknown
Gene/insert aliases:	SHC1, SHC, SHCA, FLJ26504
Species of gene(s):	H. sapiens (human)
Relevant mutations/deletions:	S36A
Fusion proteins or tags:	His
Terminal:	N terminal on backbone
Vector backbone:	pcDNA3.1 His (Search Vector Database)
Backbone manufacturer:	Invitrogen
Type of vector:	Mammalian expression
Backbone size (bp):	5500
Cloning site 5':	EcoRI
Site destroyed during cloning:	No
Cloning site 3':	EcoRI
Site destroyed during cloning:	No
5' Sequencing primer:	T7 (List of Sequencing Primers)
3' Sequencing primer:	BGHrev
Bacteria resistance:	Ampicillin
High or low copy:	High Copy
Grow in standard E. coli @ 37C:	Yes
Selectable markers:	Neomycin
Sequence:	View sequence
Plasmid Provided In:	DH5a
Principal Investigator:	Toren Finkel
Terms and Licenses:	MTA

Addgene has sequenced a portion of this plasmid for verification. Click here for the sequencing result.

Click on map to enlarge

Add to Cart

Price: $65.00

Plasmid Links
- Sequence
- Reviews (0)
- Related Plasmids
- From this article
- SHC1 plasmids
- Toren Finkel Lab Plasmids

Other Links
- NCBI: SHC1
- SHC1 antibodies

This is commonly requested with
- pcDNA3.1his p66shc

Plasmid Cart

Your cart is empty.

Recently Viewed

pcDNA3.1his p66s... Plasmid 10973

pcDNA3.1his p66shc Plasmid 10972

addgene

Find this plasmid at: www.addgene.org
Enter "10973" in the search box

Plasmid 10973: pcDNA3.1his p66shc S36A

Gene/insert name:	p66shc
Insert size (bp):	Unknown
Gene/insert aliases:	SHC1, SHC, SHCA, FLJ26504
Species of gene(s):	H. sapiens (human)
Relevant mutations/deletions:	S36A
Fusion proteins or tags:	His
Terminal:	N terminal on backbone
Vector backbone:	pcDNA3.1 His (Search Vector Database)
Backbone manufacturer:	Invitrogen
Type of vector:	Mammalian expression
Backbone size (bp):	5500
Cloning site 5':	EcoRI
Site destroyed during cloning:	No
Cloning site 3':	EcoRI
Site destroyed during cloning:	No
5' Sequencing primer:	T7 (List of Sequencing Primers)
3' Sequencing primer:	BGHrev
Bacteria resistance:	Ampicillin
High or low copy:	High Copy
Grow in standard E. coli @ 37C:	Yes
Selectable markers:	Neomycin
Sequence:	Visit www.addgene.org/10973
Plasmid Provided In:	DH5a
Principal Investigator:	Toren Finkel

Article: Redox regulation of forkhead proteins through a p66shc-dependent signaling pathway. Nemoto S et al. (Science. 2002 Mar 29. 295(5564):2450-2. Pubmed)

Please acknowledge the principal investigator and cite this article if you use this plasmid in a publication.

Also, please include the text "Addgene plasmid 10973" in your Materials and Methods section. This information allows Addgene to create a link from the plasmid page to your publication.

Please check www.addgene.org/10973 for updated plasmid information and related links.

MATERIAL SAFETY DATA SHEET

Revised 6/08/04
Replaces 4/01/04
Printed 6/08/04

PDONR229ZEOR GW VECTOR, 6UG LYOPHILIZED
INVITROGEN CORPORATION
MSDS ID: 351801

1. PRODUCT AND COMPANY INFORMATION

INVITROGEN CORPORATION
1600 FARADAY AVE.
CARLSBAD, CA 92008
760/603-7200

GIBCO PRODUCTS
INVITROGEN CORPORATION
3175 STALEY ROAD P.O. BOX 68
GRAND ISLAND, NY 14072
716/774-6700

INVITROGEN CORPORATION
3 FOUNTAIN DR.
INCHINNAN BUSINESS PARK
PAISLEY, PA4 9RF
SCOTLAND
44-141 814-6100

INVITROGEN CORPORATION
P.O. BOX 12-502
PENROSE
AUCKLAND 1135
NEW ZEALAND
64-9-579-3024

INVITROGEN CORPORATION
2270 INDUSTRIAL ST.
BURLINGTON, ONT
CANADA L7P 1A1
905/335-2255

INVITROGEN AUSTRALIA PTY LIMITED
2A/14 LIONEL ROAD
MOUNT WAVERLY VIC 3149
AUSTRALIA
1-800-331-627

EMERGENCY NUMBER (SPILLS, EXPOSURES): 301/431-8585 (24 HOUR)
800/451-8346 (24 HOUR)

NON-EMERGENCY INFORMATION: 800/955-6288

Product Name: pDONR229ZeoR GW vector, 6ug lyophilized
Stock Number: 351801

NOTE: If this product is a kit or is supplied with more than one material, please refer to the MSDS for each component for hazard information.

Product Use:
These products are for laboratory research use only and are not intended for human or animal diagnostics, therapeutic, or other clinical uses, unless otherwise stated.

Synonyms:
Not available.

2. COMPOSITION, INFORMATION ON INGREDIENTS

The following list shows components of this product classified as hazardous based on physical properties and health effects:

Component	CAS No.	Percent
EDTA	60-00-4	1 - 5
SODIUM CHLORIDE	7647-14-5	10 - 30
TRIZMA BASE	MIXTURE	40 - 70

2. COMPOSITION, INFORMATION ON INGREDIENTS (CONT.)

3. HAZARDS IDENTIFICATION

********** EMERGENCY OVERVIEW **********
Warning!
Irritant.
Harmful if swallowed.
Harmful if absorbed.
Harmful by inhalation.
May cause allergic skin reaction.
Possible reproductive system hazard based on animal data.
****

Potential Health Effects:
Eye:
Can cause moderate irritation, tearing and reddening, but not likely to permanently injure eye tissue.

Skin:
Can cause moderate skin irritation, defatting, and dermatitis. Not likely to cause permanent damage.
May cause allergic skin reaction.
Upon prolonged or repeated exposure, harmful if absorbed through the skin.
May cause minor systemic damage.

Inhalation:
Can cause moderate respiratory irritation, dizziness, weakness, fatigue, nausea and headache.
Harmful! Can cause systemic damage (see "Target Organs).

Ingestion:
Mildly irritating to mouth, throat, and stomach. Can cause abdominal discomfort.
Harmful if swallowed. May cause systemic poisoning.

Chronic:
No data on cancer.
Contains a substance that is a possible reproductive system hazard based on animal studies at doses that could be encountered in the workplace.

4. FIRST AID MEASURES

Eye:
Immediately flush eyes with plenty of water for at least 20 minutes retracting eyelids often. Tilt the head to prevent chemical from transferring to the uncontaminated eye. Get immediate medical attention

4. FIRST AID MEASURES (CONT.)

and monitor the eye daily as advised by your physician.

Skin:
Wash with soap and water. Remove contaminated clothing, launder immediately, and discard contaminated leather goods. Get medical attention immediately.

Inhalation:
Remove to fresh air. If breathing is difficult, have a trained individual administer oxygen. If not breathing, give artificial respiration and have a trained individual administer oxygen. Get medical attention immediately.

Ingestion:
Severely irritating. Do not induce vomiting. Seek medical attention immediately. Drink 2 glasses of water or milk to dilute.

Note To Physician:
Treat symptomatically.

5. FIRE FIGHTING MEASURES

Flashpoint Deg C:
Not available.

Upper Flammable Limit %:
Not available.

Lower Flammable Limit %:
Not available.

Autoignition Temperature Deg C:
Not available.

Extinguishing Media:
Can cause moderate irritation, tearing and reddening, but not likely to permanently injure eye tissue.
Use water spray/fog for cooling.

Firefighting Techniques/Equipment:
Do not enter fire area without proper protection including self-contained breathing apparatus and full protective equipment. Fight fire from a safe distance and a protected location due to the potential of hazardous vapors and decomposition products.

Hazardous Combustion Products:
Includes carbon dioxide, carbon monoxide, dense smoke.

6. ACCIDENTAL RELEASE MEASURES

Accidental releases may be subject to special reporting requirements and other regulatory mandates. Refer to Section 8 for personal protection equipment recommendations.

Spill Cleanup:
Exposure to the spilled material may be irritating or harmful. Follow personal protective equipment recommendations found in Section VIII of this MSDS. Additional precautions may be necessary based on special circumstances created by the spill including; the material spilled, the quantity of the spill, the area in which the spill occurred. Also consider the expertise of employees in the area responding to the spill.
Ventilate the contaminated area.
Prevent the spread of any spill to minimize harm to human health and the environment if safe to do so. Wear complete and proper personal protective equipment following the recommendation of Section VIII at a minimum. Dike with suitable absorbent material like granulated clay. Gather and store in a sealed container pending a waste disposal evaluation.

7. HANDLING AND STORAGE

Storage of some materials is regulated by federal, state, and/or local laws.

Storage Pressure:
Ambient

Handling Procedures:
Harmful or irritating material. Avoid contacting and avoid breathing the material. Use only in a well ventilated area.
Keep closed or covered when not in use.

Storage Procedures:
Store in a cool dry ventilated location. Isolate from incompatible materials and conditions. Keep container(s) closed.
Suitable for most general chemical storage areas.

8. EXPOSURE CONTROLS, PERSONAL PROTECTION

Exposure Limits:

Component	OSHA PEL (ppm)	AGCIH TWA (ppm)
EDTA	Not established.	Not established.
SODIUM CHLORIDE	Not established.	Not established.
TRIZMA BASE	Not established.	Not established.

Engineering Controls:

8. EXPOSURE CONTROLS, PERSONAL PROTECTION (CONT.)

Local exhaust ventilation or other engineering controls are normally required when handling or using this product to avoid overexposure.

Personal Protective Equipment:

Eye:
An eye wash station must be available where this product is used. Wear chemically resistant safety glasses with side shields when handling this product. Wear additional eye protection such as chemical splash goggles and/or face shield when the possibility exists for eye contact with splashing or spraying liquid, or airborne material. Do not wear contact lenses. Have an eye wash station available.

Skin:
Avoid skin contact by wearing chemically resistant gloves, an apron and other protective equipment depending upon conditions of use. Inspect gloves for chemical break-through and replace at regular intervals. Clean protective equipment regularly. Wash hands and other exposed areas with mild soap and water before eating, drinking, and when leaving work. Have a safety shower available.

Respiratory:
NIOSH approved air purifying respirator with dust/mist filter. A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements must be followed whenever workplace conditions warrant a respirator's use.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance/physical state:	Liquid solution / suspension
Odor:	No odor.
	Not established.
	Not established.
	Not established.
	Not established.
	Not established.
	Not established.
	Not established.
Octanol/water Partition Coeff:	Not established.
Volatiles:	Not established.
	Not established.
	Not established.
	Not established.

10. STABILITY AND REACTIVITY

Stability:
Stable under normal conditions.

Conditions to Avoid:
Strong oxidizing agents. High temperatures. Strong alkalies. Copper alloys. Aluminum alloys.

Hazardous Decomposition Products:
Carbon monoxide. Carbon dioxide. Nitrogen oxides. Chlorinated compounds.

Hazardous Polymerization:
Hazardous polymerization will not occur.

11. TOXICOLOGICAL INFORMATION

Acute Toxicity:

Dermal/Skin:
Not determined.

Inhalation/Respiratory:
Not determined.

Oral/Ingestion:
TRIZMA BASE: 5900 MG/KG

Target Organs: Kidneys. Bone marrow.

Carcinogenicity:

NTP:
Not tested.

IARC:
Not listed.

OSHA:
Not regulated.

Other Toxicological Information

12. Ecological Information

Ecotoxicological Information: No ecological information available.

Environmental Fate (Degradation, Transformation, and Persistence):
Bioconcentration is not expected to occur.
Biodegrades slowly.

13. DISPOSAL CONSIDERATIONS

Regulatory Information:
Not applicable.

Disposal Method:
Clean up and dispose of waste in accordance with all federal, state, and local environmental regulations.
Dispose of by incineration following Federal, State, Local, or Provincial regulations.

14. TRANSPORT INFORMATION

Proper Shipping Name: Not regulated.
Subsidiary Hazards:

15. REGULATORY INFORMATION

UNITED STATES:

TSCA:
This product is solely for research and development purposes only and may not be used, processed or distributed for a commercial purpose. It may only be handled by technically qualified individuals.
Materials used in manufacturing processes which are subject to compliance with the Federal Food Drug and Cosmetic Act (FDA) are not subject to the Toxic Substance Control Act (TSCA). The TSCA research use only restriction does not apply to FDA regulated manufacturing processes nor the resulting product per 15 U.S.C. 2602(2).

Prop 65 Listed Chemicals: PROP 65 PERCENT
No Prop 65 Chemicals.

No 313 Chemicals

CANADA:

15. REGULATORY INFORMATION (CONT.)

DSL/NDSL:
Not determined.

COMPONENT	WHMIS Classification
EDTA	D2A
SODIUM CHLORIDE	D2B
TRIZMA BASE	D2B

EUROPEAN UNION:

PRODUCT RISK PHRASES:
None assigned.

PRODUCT SAFETY PHRASES:
Not applicable.

PRODUCT CLASSIFICATION:
XI

Component	EINECS Number
EDTA	200-449-4
SODIUM CHLORIDE	231-598-3
TRIZMA BASE	Not established.

16. OTHER INFORMATION

HMIS Rating 0-4:
FIRE: Not determined.
HEALTH: Not determined.
REACTIVITY: Not determined.

Abbreviations
N/A - Data is not applicable or not available
SARA - Superfund and Reauthorization Act
HMIS - Hazard Material Information System
WHMIS - Workplace Hazard Materials Information System
NTP - National Toxicology Program
OSHA - Occupational Health and Safety Administration
IARC - International Agency for Research on Cancer
PROP 65 - California Safe Drinking Water and Toxic Enforcement Act of 1986
EINECS - European Inventory of Existing Commercial Chemical Substances

The above information was acquired by diligent search and/or investigation and the recommendations are based on prudent application of professional judgment. The information shall not be taken as being all inclusive and is to be used only as a guide. All materials and mixtures may present unknown

16. OTHER INFORMATION (CONT.)

hazards and should be used with caution. Since Invitrogen Corporation cannot control the actual methods, volumes, or conditions of use, the Company shall not be held liable for any damages or losses resulting from the handling or from contact with the product as described herein. THE INFORMATION IN THIS MSDS DOES NOT CONSTITUTE A WARRANTY, EXPRESS OR IMPLIED, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE.

SAFETY DATA SHEET

1. Identification of the substance/mixture and of the company/undertaking

Identification of the substance/preparation

Product code A1377801
Product name CytoTune™ Sendai Reprogramming Kit

Company/Undertaking Identification

Life Technologies
5791 VAN ALLEN WAY
PO BOX 6482
CARLSBAD, CA 92008
+1 760 603 7200

INVITROGEN CORPORATION
5250 MAINWAY DRIVE
BURLINGTON, ONT
CANADA L7L 6A4
800/263-6236

24 hour Emergency Response (Transport): 866-536-0631
301-431-8585
Outside of the U.S. +1-301-431-8585

For research use only. Not intended for human or animal diagnostic or therapeutic uses.

2. Hazards identification

GHS - Classification

Signal Word
not hazardous

Health Hazard
not hazardous

Physical Hazards
not hazardous

Principle Routes of Exposure/ Potential Health effects

Eyes	May cause eye irritation with susceptible persons.
Skin	May cause skin irritation in susceptible persons.
Inhalation	May be harmful by inhalation.
Ingestion	May be harmful if swallowed.

Specific effects

Carcinogenic effects	none
Mutagenic effects	none
Reproductive toxicity	none
Sensitization	none
Target Organ Effects	No known effects under normal use conditions.
Pathogenicity	Non-pathogenic

Risk Group Classification
Biosafety Risk Group 2

HMIS

Health	0
Flammability	0
Reactivity	0

3. Composition/information on ingredients

Chemical Name	CAS-No	EINECS-No	Weight %
Recombinant Sendai Virus Particles	NONE	-	<1

We recommend handling all chemicals with caution.

Biological material(s)

The Sendai virus in this kit is a non-transmissible virus, with the Fusion protein deleted. Therefore they are no longer capable of producing infectious particles from infected cells

Although the CytoTune Sendai virus is non-transmissible, cells that have been exposed to the virus should be tested with PCR or antibody staining to ensure the absence of the virus before being inoculated into animals. Animals that have already been infected with wild type Sendai virus may be able to make infectious CytoTune-Sendai virus.

4. First aid measures

Skin contact Wash off immediately with plenty of water. Consult a physician.

Eye contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Consult a physician.

Ingestion Consult a physician. Never give anything by mouth to an unconscious person. Do not induce vomiting without medical advice.

Inhalation Move to fresh air. If symptoms persist, call a physician. If not breathing, give artificial respiration.

Notes to physician Treat symptomatically.

5. Fire-fighting measures

Suitable extinguishing media Water spray. Carbon dioxide (CO2). Foam. Dry chemical.

Special protective equipment for firefighters Wear self-contained breathing apparatus and protective suit.

6. Accidental release measures

Personal precautions Use personal protective equipment. Avoid contact with the skin and the eyes.

Methods for cleaning up Decontaminate with 70% Ethanol, chlorine bleach or detergent based disinfectant. Other decontamination agents are commercially available.

NOTE:

A risk assessment must be performed to determine the correct decontamination agent and contact time, based on the volume of material to inactivate and the area to decontaminate.

Environmental precautions

Prevent further leakage or spillage if safe to do so.

See Section 12 for additional information.

7. Handling and storage

Handling Always wear reccommended Personal Protective Equipment. Avoid contact with skin and eyes.

Storage Keep in a dry, cool and well-ventilated place.

8. Exposure controls/personal protection

Exposure limits

We are not aware of any national exposure limit.

Engineering measures Handle in accordance with Biosafety Risk Group / Biosafety Level 2 requirements. Engineering controls such as chemical and/or biological safety cabinets with HEPA filters should be used as deemed appropriate by local safety personal.

Personal protective equipment

Personal Protective Equipment requirements are dependent on the user institution's risk assessment and are specific to the risk assessment for each laboratory where this material may be used.

Respiratory protection In case of insufficient ventilation wear suitable respiratory equipment.

Hand protection Impervious gloves.
Eye protection Safety glasses with side-shields.
Skin and body protection. Lightweight protective clothing.
Hygiene measures Handle in accordance with Standard Microbial Practices and Good Laboratory Practices.

Environmental exposure controls Prevent product from entering drains.

9. Physical and chemical properties

General Information

Form	suspension, liquid	
Appearance	No information available	
Odor	No information available	
Boiling Point/Range	**°C** no data available	**°F** no data available
Melting point/range	**°C** no data available	**°F** no data available
Flash point	**°C** no data available	**°F** no data available
Autoignition temperature	**°C** no data available	**°F** no data available
Oxidizing properties	No information available.	
Water solubility	soluble	

10. Stability and reactivity

Stability Stable under normal conditions.
Materials to avoid No dangerous reaction known under conditions of normal use.
Hazardous decomposition products None under normal use
polymerization Hazardous polymerisation does not occur.

11. Toxicological information

Acute toxicity

not hazardous

Principle Routes of Exposure/ Potential Health effects

Eyes	May cause eye irritation with susceptible persons.
Skin	May cause skin irritation in susceptible persons.
Inhalation	May be harmful by inhalation.
Ingestion	May be harmful if swallowed.
Carcinogenic effects	none
Mutagenic effects	none
Reproductive toxicity	none
Sensitization	none
Pathogenicity	Non-pathogenic

12. Ecological information

Ecotoxicity effects	No information available.
Mobility	No information available.
Biodegradation	No information available.
Bioaccumulation	Does not bioaccumulate.

13. Disposal considerations

Dispose of in accordance with local regulations
All infectious material must be decontaminated before disposal using autoclave, chemical disinfection, gaseous decontamination, irradiation, incineration, or other appropriate method.

14. Transport information

IATA

Proper shipping name	Not classified as dangerous in the meaning of transport regulations
Hazard class	none
Subsidiary Class	none
Packing group	none
UN-No	None

15. Regulatory information

U.S. Federal Regulations

SARA 313
This product is not regulated by SARA.

Clean Air Act, Section 112 Hazardous Air Pollutants (HAPs) (see 40 CFR 61)
This product does not contains HAPs.

U.S. State Regulations

California Proposition 65
This product does not contain chemicals listed under Proposition 65

WHMIS hazard class:
Non-controlled

This product has been classified according to the hazard criteria of the CPR and the MSDS contains all of the information required by the CPR

16. Other information

Reason for Revision (M)SDS sections updated.

For research use only. Not intended for human or animal diagnostic or therapeutic uses.

References

• Centers for Disease Control, Biosafety in Microbiological and Biomedical Laboratories (BMBL), 5th edition.
http://www.cdc.gov/biosafety/publications/bmbl5/index.htm
• World Health Organization, Laboratory Biosafety Manual, Third Edition
http://www.who.int/csr/delibepidemics/WHO_CDS_CSR_LYO_2004_11/en/

The above information was acquired by diligent search and/or investigation and the recommendations are based on prudent application of professional judgment. The information shall not be taken as being all inclusive and is to be used only as a guide. All materials and mixtures may present unkown hazards and should be used with caution. Since the Company cannot control the actual methods, volumes, or conditions of use, the Company shall not be held liable for any damages or losses resulting from the handling or from contact with the product as described herein. THE INFORMATION IN THIS MSDS DOES NOT CONSTITUTE A WARRENTY, EXPRESSED OR IMPLIED, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PUPOSE.

End of Safety Data Sheet

CIHR IRSC

December 4, 2012

Dr. Dean BETTS
Department of Physiology and Pharmacology
Schulich School of Medicine & Dentistry
Dental Sciences Building, Room DSB 2022
Western University
London, Ontario
N6A 5C1

Re: Stem Cell Oversight Committee review of "Modulation of pluripotent stem cell renewal, and differentiation through splice variants of telomerase reverse transcriptase"

Dear Dr. Betts:

The Stem Cell Oversight Committee (SCOC) met by teleconference on November 28, 2012 to review your stem cell research application for conformity to the *Guidelines for Human Pluripotent Stem Cell Research* (http://www.cihr-irsc.gc.ca/e/42071.html; "the Guidelines"). Thank you for also submitting the draft research agreement and clarifying the sources of funding as requested by email following the teleconference.

Until recently, SCOC had to submit its recommendations on the conformity of all human pluripotent stem cell research applications to the *Guidelines* to Governing Council for its endorsement. However, at its March 24-25, 2010 meeting Governing Council delegated its authority to approve research using existing SCOC-approved human embryonic stem cell (hESC) lines and/or human induced pluripotent stem (iPS) cells to SCOC.

The Committee has approved your request to use the SCOC-approved CA1, CA2, H1, H9 and hES2 hESC lines and human iPS cells. Since the proposed research falls under Governing Council's delegation of authority, this letter constitutes final approval by CIHR of the above-mentioned project. As CIHR does not notify co-applicants, we ask that you please inform those individuals and their research institutions (if different from your own) of the outcome of this application.

If, in the future, you wish to use additional SCOC-approved hESC lines not described in the original SCOC application for this research project, you need only to notify SCOC in writing. You should include the exact title of your original application and date of submission. There will be no need to submit an amended application for SCOC review.

If there are major changes in your research plan, you will need to seek SCOC approval by submitting a description of the proposed human pluripotent stem cell research.

...2

Canadian Institutes of Health Research
160 Elgin Street, 9th Floor, Address Locator 4809A
Ottawa, Ontario K1A 0W9 Tel.: (613) 941-2672
Fax: (613) 954-1800 **www.cihr-irsc.gc.ca**

Instituts de recherche en santé du Canada
160, rue Elgin, 9e étage, Indice de l'adresse 4809A
Ottawa, Ontario K1A 0W9 Tél.: (613) 941-2672
Fax : (613) 954-1800 **www.irsc-cihr.gc.ca**

Canada

SCOC should also be advised of any conflicts of interest that may arise during the course of this research.

All the best in your research endeavours.

Sincerely yours,

Jane E. Aubin, Ph.D.
Chief Scientific Officer and
Vice-President, Research and Knowledge Translation

c.c. John Williams, Chair, Stem Cell Oversight Committee
Marta Arnaldo, Manager, Governance Secretariat Operations
Danika Goosney, Director, Science, Knowledge Translation and Ethics
Peggy Borbey, Director, Open Programs

/lnc-bb-me

Certificate of Analysis

Product Description	WA09	
Cell Line Provider	WiCell Research Institute	
Parent Material	WA09-MCB-01	
Lot Number	WB0007	
Date Vialed	22-April-2010	
Passage Number	p22[1]	
Culture Platform	Feeder Independent	
	Media: TeSR	Matrix: Matrigel

The following testing specifications have been met for the specified product lot:

Test Description	Test Provider	Test Method	Test Specification	Result
Post-Thaw Viable Cell Recovery	WiCell	SOP-CH-305	≥ 15 Undifferentiated Colonies, ≤ 30% Differentiation	Pass
Identity by STR	UW Molecular Diagnostics Laboratory	PowerPlex 1.2 System by Promega	Consistent witih known profile	Pass
Sterility - Direct transfer method	Apptec	30744	Negative	Pass
Mycoplasma	Bionique	M250	No contamination detected	Pass
Karyotype by G-banding	WiCell	SOP-CH-003	Normal karyotype	Pass

[1]Due to space limitations, only the overall passage number is included on the vial. Prior to freeze, these cells were cultured for a total of 21 passages, 5 of them in mTeSR1/Matrigel. WiCell adds +1 to the overall passage number at freeze so that the number on the vial best represents the overall passage number of the cells at thaw. Foornote provided by T.L. 29Oct10.

Cells distributed by WiCell are intended for research purposes only and are not intended for use in humans.

Appropriate biosafety precautions should be followed when working with these cells. The end user is responsible for ensuring that the cells are handled and stored in an appropriate manner. WiCell is not responsible for damages or injuries that may result from the use of these cells.

Amendment(s):

Reason for Amendment	Date
CoA updated for clarification of passge number, test specifications, product description, and removed text regarding technical services and distribution lots	See signature
Original CoA	12-August-2010

Date of Lot Release	Quality Assurance Approval
12-August-2010	11/1/2010 X AMC AMC Quality Assurance

UW Health

University of Wisconsin
Hospital and Clinics

Histocompatibility/Molecular Diagnostics Laboratory

Short Tandem Repeat Analysis*

Sample Report: 5771-STR | UW HLA#: 63399 | Sample Date: 07/02/10
Received Date: 07/02/10

Requestor: WiCell Research Institute

Test Date: 07/06/10 | File Name: 100707 | Report Date: 07/12/10

Sample Name: (label on tube) **5771-STR**

Description: DNA Extracted by WiCell
250.37 ug/mL; 260/280 = 1.90

Locus	Repeat #	STR Genotype
D16S539	5, 8-15	12,13
D7S820	6-14	9,11
D13S317	7-15	9,9
D5S818	7-15	11,12
CSF1PO	6-15	11,11
TPOX	6-13	10,11
Amelogenin	NA	X,X
TH01	5-11	9.3,9.3
vWA	11, 13-21	17,17

Comments: Based on the DNA 5771-STR dated and received on 07/02/10 from WI Cell, this sample (UW HLA# 63399) matches exactly the STR profile of the human stem cell line H9 comprising 12 allelic polymorphisms across the 8 STR loci analyzed. No STR polymorphisms other than those corresponding to the human H9 stem cell line were detected and the concentration of DNA required to achieve an acceptable STR genotype (signal/noise) was equivalent to that required for the standard procedure (~1 ng/amplification reaction) from human genomic DNA. These results suggest that the 5771-STR DNA sample submitted corresponds to the H9 stem cell line and it was not contaminated with any other human stem cells or a significant amount of mouse feeder layer cells. Sensitivity limits for detection of STR polymorphisms unique to either this or other human stem cell lines is estimated to be ~5%.

1/13/10
Date
HLA/Molecular Diagnostics Laboratory

07/13/10
Date
HLA/Molecular Diagnostics Laboratory

* Testing to assess engraftment following bone marrow transplantation was accomplished by analysis of human genetic polymorphisms at STR loci. This methodology has not yet been approved by the FDA and is for investigational use only.

File: Final STR Report

Test Facility:

WuXi AppTec

Report Number
837137

WiCell Research Institute

June 02, 2010
P.O. #:

STERILITY TEST REPORT

Sample Information:
hES Cells
1: WA09-WB0007 # 5170
2: WA18-WB0003 # 0651
3: WA18-WB0010 # 8027
4: WA19-WB0015 # 7336
5: WA19-WB0013 # 5777
6: WA20-WB0014 # 9912
7: iPS(IMR90)-3-MCB-01 #3377
8: iPS(Foreskin)-3-WB0002 # 2503

Date Received: May 13, 2010
Date in Test: May 18, 2010
Date Completed: June 01, 2010

Test Information:
Test Codes: 30744, 30744A
Immersion, USP / 21 CFR 610.12
Procedure #: BS210WCR.201

TEST PARAMETERS	PRODUCT	
Approximate Volume Tested	0.5 mL	0.5 mL
Number Tested	16	16
Type of Media	SCD	FTM
Media Volume	400 mL	400 mL
Incubation Period	14 Days	14 Days
Incubation Temperature	20 °C to 25 °C	30 °C to 35 °C
RESULTS	16 NEGATIVE	16 NEGATIVE

QA Reviewer 06-03-10 **Date**

Technical Reviewer 06-02-10 **Date**

Testing conducted in accordance with current Good Manufacturing Practices.

APPENDIX

Document ID #:	DCF9002F
Title:	QUALITY ASSURANCE REPORT - GMP
Effective Date:	03/12/10
Edition #:	01

QUALITY ASSURANCE REPORT – GMP

TEST PERFORMED	PROCEDURAL REFERENCE	TEST PERFORMED	PROCEDURAL REFERENCE
☒ M-250	SOP's 3008, 3011, 3013	☐ M-700	SOP's 3008, 3009, 3010
☐ M-300	SOP's 3008, 3014	☐ M-800	SOP's 3008, 3011, 3016
☐ M-350	SOP's 3008, 3014, 3015		

Bionique Sample ID #(s) 61671

This testing procedure was performed in compliance with the FDA's Current Good Manufacturing Practice (cGMP) standards (to the extent that the regulations pertain to the procedures performed) as specified in the Code of Federal Regulations, Title 21 Parts 210 and 211 [21 CFR 210 & 211]. All related records derived from the test procedures have been reviewed by the Quality Assurance Department. The individual's signature below verifies that the methods and procedures referenced above have been followed and that the Final Report accurately reflects the raw data generated during the course of the procedures. All records, including raw data and final reports are archived on site for a minimum of seven years.

The specified test's procedures determine the intervals at which samples are inspected. The medium used for testing must pass quality control mycoplasmal growth promotion testing and sterility testing. Traceability of all of the components used is assured and supporting documentation can be supplied upon request.

Quality Assurance Review Date: 7/28/10

Reviewed By , QA Assistant: ___

NOTE:

1. Prior to receipt at Bionique® Testing Laboratories, Inc., the stability of the test article is the responsibility of the company submitting the sample. Bionique Testing Laboratories Inc. will assume responsibility for sample stability following receipt and prior to being placed on test.
2. This test is for the detection of microbiological growth and does not require statistical validation.

REFERENCES

Regulatory:

1. Department of Health and Human Services, Food and Drug Administration (USA) [FDA]. Code of Federal Regulations [CFR], Title 21 CFR Part 210, Current Good Manufacturing Practice in Manufacturing, Processing, Packing, or Holding of Drugs; General. FDA. Office of the Federal Register, National Archives and Records Department.
2. Department of Health and Human Services, Food and Drug Administration (USA) [FDA]. Code of Federal Regulations [CFR], Title 21 CFR Part 211, Current Good Manufacturing Practice for Finished Pharmaceuticals. FDA. Office of the Federal Register, National Archives and Records Department.
3. Department of Health and Human Services, Food and Drug Administration (USA) [FDA]. Points to Consider in the Characterization of Cell Lines Used to Produce Biologicals, Director, Center for Biologics Evaluation and Research, FDA. May, 1993. Docket No. 84N-0154.
4. Department of Health and Human Services, Food and Drug Administration (USA) [FDA]. Code of Federal Regulations [CFR], Title 21 CFR Part 610.30, General Biological Products Standards; Subpart D, Test for Mycoplasma. FDA. Office of the Federal Register, National Archives and Records Department.

General:

1. Barile MF, Kern J. Isolation of Mycoplasma arginini from commercial bovine sera and its implication in contaminated cell cultures. Proceedings of the Society for Experimental Biology and Medicine, Volume 138, Number 2, November 1971.
2. Chen, T.R. In situ detection of mycoplasma contamination in cell cultures by fluorescent Hoechst 33258 stain. Experimental Cell Research, 104: 255-262, 1977.
3. Carolyn K. Lincoln and Daniel J. Lundin. Mycoplasma Detection and Control. U. S. Fed. for Culture Collections Newsletter, Vol. 20, Number 4, 1990.
4. Fetal Bovine Serum; Proposed Guideline. National Committee For Clinical Laboratory Standards (NCCLS), Vol. 10, Number 6, 1990. (NCCLS publication M25-P).
5. McGarrity GJ, Sarama J, Vanaman V. Cell Culture Techniques. ASM News, Vol. 51, No. 4, 1985.
6. Tully JG, Razin S. Methods in Mycoplasmology, Volumes I and II. Academic Press, N.Y., 1983.
7. Barile MF, Razin S, Tully JG, Whitcomb RF. The Mycoplasmas, Volumes 1-4. Academic Press, N.Y., 1979.
8. http://www.bionique.com/ - Safe Cells Insights

Document#: DCF3013D
Edition#: 10
Effective Date: 07/15/2003
Title: **M-250 FINAL REPORT SHEET**

M-250 FINAL REPORT

Direct Specimen Culture
Procedure 3008, 3011, 3013

TO: WiCell QA
WiCell Research Institute

BTL SAMPLE ID#: **61671** P.O.#: DATE REC'D: **06/29/2010**

TEST/CONTROL ARTICLE:

WA09-WB0007 #5771

LOT#: **NA**

DIRECT CULTURE SET-UP (DAY 0) DATE: **06/30/2010**

INDICATOR CELL LINE (VERO) SEE DNA FLUOROCHROME RECORD SHEET

				DATE
THIOGLYCOLLATE BROTH	DAY 7	+	⊖	**07/07/2010**
	DAY 28	+	⊖	**07/28/2010**
BROTH-FORTIFIED COMMERCIAL				
0.5 mL SAMPLE	DAY 7	+	⊖	**07/07/2010**
6.0 mL BROTH	DAY 28	+	⊖	**07/28/2010**
BROTH-MODIFIED HAYFLICK				
0.5 mL SAMPLE	DAY 7	+	⊖	**07/07/2010**
6.0 mL BROTH	DAY 28	+	⊖	**07/28/2010**
BROTH-HEART INFUSION				
0.5 mL SAMPLE	DAY 7	+	⊖	**07/07/2010**
6.0 mL BROTH	DAY 28	+	⊖	**07/28/2010**

(See Reverse)

Document#: DCF3013D
Edition#: 10
Effective Date: 07/15/2003
Title: M-250 FINAL REPORT SHEET

SAMPLE ID#: **61671**		AEROBIC	MICROAEROPHILIC	DATE
AGAR PLATES-FORTIFIED COMMERCIAL	DAY 7	+ ⊖	+ ⊖	07/07/2010
	DAY 14	+ ⊖	+ ⊖	07/14/2010
	DAY 21	+ ⊖	+ ⊖	07/21/2010
AGAR PLATES-MODIFIED HAYFLICK	DAY 7	+ ⊖	+ ⊖	07/07/2010
	DAY 14	+ ⊖	+ ⊖	07/14/2010
	DAY 21	+ ⊖	+ ⊖	07/21/2010
AGAR PLATES-HEART INFUSION	DAY 7	+ ⊖	+ ⊖	07/07/2010
	DAY 14	+ ⊖	+ ⊖	07/14/2010
	DAY 21	+ ⊖	+ ⊖	07/21/2010
BROTH SUBCULTURES (DAY 7)		DATE: **07/07/2010**		
AGAR PLATES-FORTIFIED COMMERCIAL	DAY 7	+ ⊖	+ ⊖	07/14/2010
	DAY 14	+ ⊖	+ ⊖	07/21/2010
	DAY 21	+ ⊖	+ ⊖	07/28/2010
AGAR PLATES-MODIFIED HAYFLICK	DAY 7	+ ⊖	+ ⊖	07/14/2010
	DAY 14	+ ⊖	+ ⊖	07/21/2010
	DAY 21	+ ⊖	+ ⊖	07/28/2010
AGAR PLATES-HEART INFUSION	DAY 7	+ ⊖	+ ⊖	07/14/2010
	DAY 14	+ ⊖	+ ⊖	07/21/2010
	DAY 21	+ ⊖	+ ⊖	07/28/2010

RESULTS: No detectable mycoplasmal contamination

7/28/10
Date

Laboratory Director

M-250 Procedural Summary: The objective of this test is to ascertain whether or not detectable mycoplasmas are present in an in vitro cell culture sample, be it a primary culture, hybridoma, master seed stock or cell line. This procedure combines an indirect DNA staining approach to detect non-cultivable mycoplasmas with a direct culture methodology utilizing three different mycoplasmal media formulations. The indirect approach involves the inoculation of the sample into a mycoplasma-free VERO (ATCC) indicator cell line and performing a DNA fluorochrome assay after 72-120 hours of incubation. The direct culture aspect of the test utilizes three different mycoplasmal media including both broth and agar formulations. The sample is inoculated into each of the 3 broth formulations and also onto duplicate plates (0.1 mL/plate) for each of the 3 agar formulations. Subculture from broth to fresh agar plates is carried out after 7 days incubation. Agar plates are incubated aerobically and microaerophillically in order to detect any colony forming units morphologically indicative of mycoplasmal contamination. Issuance of the final report with signature of the Laboratory Director signifies that the required controls were performed concurrently with the test sample(s) as detailed in the referenced SOPs and that all test conditions have been found to meet the required acceptance criteria for a valid test, including the appropriate results for the positive and negative controls.

bionique Testing Laboratories

MYCOPLASMA TESTING SERVICES

Document ID #:	DCF3008A
Title:	**DNA FLUOROCHROME ASSAY RESULTS**
Effective Date:	3/24/10
Edition #:	07

DNA-FLUOROCHROME ASSAY RESULTS

Procedures 3008, 3009, 3011

Sample ID # **61671** **M-250** Date Rec'd: **06/29/2010** P.O. #

Indicator Cells Inoculated: Date/Initials: 7/1/10 / JA

Fixation: Date/Initials: 7/5/10 / HB

Staining: Date/Initials: 7/5/10 / HB

TEST/CONTROL ARTICLE:

WA09-WB0007 #5771

LOT# **NA**

WiCell QA
WiCell Research Institute

DNA FLUOROCHROME ASSAY RESULTS:

__X__ **NEGATIVE:** A reaction with staining limited to the nuclear region, which indicates no mycoplasmal contamination.

_____ **POSITIVE:** A significant amount of extranuclear staining which strongly suggests mycoplasmal contamination.

_____ **INCONCLUSIVE:**

_____ A significant amount of extranuclear staining consistent with low - level mycoplasmal contamination or nuclear degeneration.

_____ A significant amount of extranuclear staining consistent with bacterial, fungal or other microbial contaminant or viral CPE. Morphology not consistent for mycoplasmal contamination.

COMMENTS:

Date: 7/5/10 Results Read by: HB Date of Review: 7/6/10 Reviewed by: SAB

WiCell Cytogenetics Report: 001865-061810
WISC 5771

Report Date: June 28, 2010

Case Details:

Cell Line: *WA09-WB0007 (5771)*

Passage #: *22*

Date Completed: *6/28/2010*

Cell Line Gender: *Female*

Investigator:

Specimen: *hESC on Matrigel*

Date of Sample: *6/18/2010*

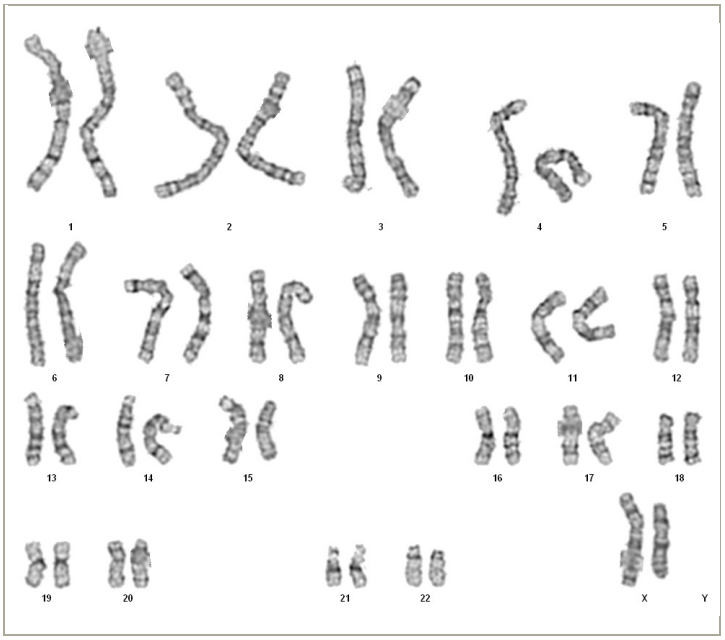
Tests,Reason for: *WB testing*

Results: *46,XX*

Completed by *MS, CG(ASCP), on 6/28/2010*

Reviewed and interpreted by *PhD, FACMG, on 6/28/2010*

Interpretation: *No clonal abnormalities were detected at the stated band level of resolution.*



Cell: *S01-04*

Slide: *B-20*

Slide Type: *Karyotyping*

# of Cells Counted: 20

# of Cells Karyotyped: 4

# of Cells Analyzed: 8

Band Level: 500-550

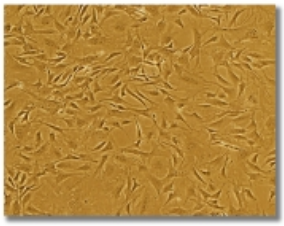
Results Transmitted by Fax / Email / Post **Date:**_____
Sent By:_____ **Sent To:**_____
QC Review By: _____ **Results Recorded:** _____

CF-1 MEF 4M IRR

CF-1 MEFs are ideal for supporting healthy undifferentiated human and mouse ES and iPS cells in culture. CF-1 MEFs are the traditional feeder cells for culturing pluripotent cells. They are mitotically arrested by irradiation treatment and will not proliferate.

Price: **$44.00**
Cat.No.: GSC-6001G
Unit Size 4-5 million cells/vial
Availability: In Stock

Qty: 1 Add to Cart



Click to enlarge

Product Cart

No Items in Cart

Overview Description Technical Data Related Products (14)

Quality MEFs for Maintaining Quality Pluripotent Cells
The success of maintaining human and mouse ESC/iPSC begins with the propagation of healthy feeder cultures. We recommend using our mouse embryonic fibroblasts (MEF) as feeders. The MEF feeder cells support and maintain ESC/iPSC in the undifferentiated state. Our MEF have been rendered mitotically inactive via irradiation or chemical treatment with Mitomycin C. Untreated MEF are also available.

Our MEF have successfully been used with ESC/iPSC lines from species other than human or mouse. If you want to use them with pluripotent stem cells derived from other species please test them first to ensure compatibility.

Save Time and Money

Save time and trouble dealing with an animal facility, performing tedious, time-consuming dissections, and the time required to expand and test the cells - day after day, week after week. Focus on your research.

Meticulous Quality Control

Work with confidence. Comprehensive testing of each lot minimizes contamination risks to your lab. Our MEF are derived and comprehensively tested on mouse and human ES cells to ensure robust and consistent performance with every lot. In addition they are:

Negative for bacterial/fungal contamination
Negative for Mycoplasma – PCR assay
Negative for mouse pathogens
Post thaw viability: typically greater than 95%

Recommended Plating

There is a wide range of MEF plating densities used by researchers for mouse and human pluripotent stem cell culturing. The density depends on the ESC or iPSC lines you

are culturing. We recommend that you use the feeder density previously used by the source lab from which you received the cell line; or the density determined through personal experience to be appropriate for your specific stem cell line. GlobalStem's MEF have been successfully used to support undifferentiated pluripotent stem cells at densities ranging from 2 x 10^4-5.3 x 10^4 cells/cm^2.

The MEF should be plated 24 hours prior to plating the ESC or IPC and can be used for 7–10 days.

If the feeder cells are too sparse, they may not maintain the pluripotent cells without differentiation, and the pluripotent cells may not attach well. If the MEF are too dense, the feeder layer may detach from the plate, and the culture will be lost.

Gelatin Coating not Required

Our MEFs do not require gelatin coating of the plates prior to use. Using gelatin coating does not benefit or inhibit the ability of the MEFs to support pluripotent stem cells. We recommend not using gelatin with our MEFs because it adds in an extra step and could be a source off variation in culturing the cells. The use of gelatin is up to the individual researcher.

From: Jennifer Stanley <jstanle2@uwo.ca>
To: Dean Betts
Date: 4/19/2012 5:14 PM
Subject: Re: Fwd: Re: Modification Form: Betts

THanks!

On 4/19/2012 9:44 AM, Dean Betts wrote:
> Hi Jennifer,
>
> We are culturing these cells and conducting various molecular biology assays on them to evaluate gene expression levels of various genes involved in regulating the pluripotent cell state.
>
> These cells came from sterile explant cultures of canine blastocysts (early embryos) that were retrieved from sterile flushing of the reproductive tracts obtained by surgical spays of inseminated bitches. After surgical spays all dogs were successfully adopted. These dogs were housed in the University of Guelph's Central Animal Facility (CAF) and were obviously tested for any possible pathogen and care for by the animal care technicians and monitored by the CAF veterinarians. All procedures were approved by the animal care committee (ACC) at the University of Guelph for procedures outlined in our animal utilization protocol (AUP03R19). These cell lines were derived by my laboratory when I was employed as a faculty member at the Ontario Veterinary College at the University of Guelph.
>
> These cells are clean and are know consider established lines.
>
> Does this information suffice?
>
> Thanks Jennifer
>
> Dean
>
>
> Dean H. Betts
> Associate Professor
> Department of Physiology& Pharmacology
> Department of Obstetrics and Gynaecology
> Schulich School of Medicine& Dentistry
> Dental Sciences Building, Room DSB 2022
> Western University
> London, Ontario, Canada
> N6A 5C1
>
> Office: 519-661-3786
> Fax: 519-661-3827
> Lab: 519-661-2111 ext. 80971
>
> dean.betts@schulich.uwo.ca
>
> Website: http://publish.uwo.ca/~dbetts/Dean_H._Betts/Welcome.html

>
>>>> Jennifer Stanley<jstanle2@uwo.ca> 4/18/2012 6:07 PM>>>
> Hi Dr. Betts
> Do you have a brief description of what you do with these cells?
> Where do these cells come from? Any idea of the history (ie have the
> mothers been tested for Rabies, etc.)?
> Regards,
> Jennifer
>
> -------- Original Message --------
> Subject: Re: Modification Form: Betts
> Date: Mon, 16 Apr 2012 12:01:42 -0400
> From: Dean Betts<Dean.Betts@schulich.uwo.ca>
> To: Jennifer Stanley<jstanle2@uwo.ca>
>
>
>
> Hi Jennifer,
>
> here is my signed modification form. Thanks
>
> Dean
>
>
>
> Dean H. Betts
> Associate Professor
> Department of Physiology& Pharmacology
> Department of Obstetrics and Gynaecology
> Schulich School of Medicine& Dentistry
> Dental Sciences Building, Room DSB 2022
> Western University
> London, Ontario, Canada
> N6A 5C1
>
> Office: 519-661-3786
> Fax: 519-661-3827
> Lab: 519-661-2111 ext. 80971
>
> dean.betts@schulich.uwo.ca
>
> Website: http://publish.uwo.ca/~dbetts/Dean_H._Betts/Welcome.html
>
>>>> Jennifer Stanley<jstanle2@uwo.ca> 4/13/2012 1:53 PM>>>
> Hi there
>
> Please do the attached modification to add:
>
> canine embryonic stem cell lines

>
> Please see attached,
> Jennifer
>
>
>
>
>
>
>