

## **SOP: Batch Culture of anti-IL-8 Monoclonal Antibody secreting CHO DP-12 Cells**

### **Approvals:**

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Date 19MAR17

Reviewer: Dr. Margaret Bryans

Date 20MAR17

### **1. Purpose:**

- 1.1. Batch culture of the CHO DP12 cell line for the production of recombinant human Anti-IL-8 monoclonal antibodies. Cells will be cultured in 100 mL spinner flask and scaled up to 1L in a bioreactor.

### **2. Scope:**

- 2.1. Applies to the production of recombinant Anti-IL-8 monoclonal antibodies from recombinant Chinese Hamster Ovary (CHO) DP12 clone.

### **3. Responsibilities:**

- 3.1. It is the responsibility of the course instructor/lab assistant to ensure that this SOP is performed as described and to update the procedure when necessary.
- 3.2. It is the responsibility of the students/technicians to follow the SOP as described and to inform the instructor about any deviations or problems that may occur while performing the procedure.

### **4. References:**

- 4.1. CHO DP12 -ATCC® CRL-12444/12445 cell line construction culture method (<https://www.atcc.org/Products/All/CRL-12445.aspx>)
- 4.2. SOP: Labconco Purifier Class 2 Biological Safety Cabinet (BSC) Operation, Document No: UP 1, Effective Date, 18JAN14
- 4.3. SOP: Bellco Spinner Flask (100 mL) Cleaning and Autoclaving, Document No: UP 2, Effective Date 08APR09
- 4.4. SOP: Tuttnauer 3850 ELV Autoclave Operation, Document No: VAL 4, Effective Date 27NOV13
- 4.5. SOP: Oakton PC 700 Bench Series pH/ Conductivity/°C/°F Meter, Document No: MET1, Effective 10JAN14
- 4.6. **SOP: Spectrophotometer**
- 4.7. SOP: Glucose Determination Assay, Document No: QCB 3, Effective Date 26JUN14
- 4.8. SOP: Lactate Determination Assay, Document No: QCB 4, Effective Date 27JUN14
- 4.9. SOP: Trypan Blue Assay SOP, Document No: UP 6, Effective Date 02JAN14
- 4.10. SOP: Operation of Life Technologies Countess II Cell Counter, Document No: UP 5, Effective Date, 10JUL15
- 4.11. **SOP Human anti-IL-8 ELISA**
- 4.12. SOP: Applikon ez-Control Bioreactor Controller Operation, Document No: UP 4, Effective 21 DEC13

### **5. Definitions: N/A**

### **6. Precautions:**

- 6.1. Use BL2 safety measures and discard waste in biohazard containers.

### **7. Equipment and Materials:**

#### **7.1. Equipment**

- 7.1.1. Biological safety cabinet

## **SOP: Batch Culture of anti-IL-8 Monoclonal Antibody secreting CHO DP-12 Cells**

- 7.1.2. CO2 incubator
- 7.1.3. Fisher Scientific Isotemp Low speed magnetic stirrer
- 7.1.4. Clean and autoclaved 100 mL Bellco spinner flasks
- 7.1.5. Thermo Scientific Biomate UV-visible recording spectrophotometer
- 7.1.6. Thermo Scientific Evolution 220 UV-vis spectrophotometer
- 7.1.7. Oakton PC 700 Bench Series pH/Conductivity/°C/°F Meter
- 7.1.8. Fisher Scientific Isotemp 37°C water bath
- 7.1.9. Fisherbrand Microcentrifuge
- 7.1.10. Nikon E100-LED Compound Light Microscope with 100x magnification (10X objective lens)
- 7.1.11. Life Technologies Countess II Cell Counter
- 7.1.12. Biorad iMark Microplate reader
- 7.1.13. Applikon ez-Control Bioreactor Controller with A 3-liter glass autoclavable bioreactor and the processor
- 7.1.14. 500 mL and 1 L liquid addition/feed bottles
- 7.1.15. 250 mL glass feed bottle for 150 mL alkaline solution
- 7.1.16. 100 mL glass bottle
- 7.1.17. Male and female autoclavable connectors
- 7.1.18. Tubing clamps
- 7.1.19. Gas filters, 0.2µm
- 7.1.20. Autoclavable silicone tubing size 14(1.6mm interior diameter)
- 7.1.21. Autoclavable silicone tubing size 16(3.1mm interior diameter)
- 7.1.22. Autoclavable silicone tubing size 25(4.8mm interior diameter)
- 7.1.23. Laboratory gasses:
  - 7.1.23.1. Air compressor
  - 7.1.23.2. O2 (optional)
  - 7.1.23.3. CO2

### **7.2. Materials**

- 7.2.1. Vials of CHO DP12 cells (ATCC CRL-12445/12444)
- 7.2.2. Dulbecco's Modified Eagle's Medium (DMEM) Corning # 10-017 CV
- 7.2.3. Superlow IgG Fetal Bovine Serum (Hyclone # SH3089802)
- 7.2.4. Insulin-Transferrin Selenium (ITS-G)-100X (Gibco # 41400-045)
- 7.2.5. 0.2mM Methotrexate stock solution (1000X) in PBS
- 7.2.6. Nalgene 250 mL 0.2 um Filter Units
- 7.2.7. Trypan Blue (0.4% solution)
- 7.2.8. 10X PBS
- 7.2.9. 150 mL of 1M NaHCO3 (sodium bicarbonate)
- 7.2.10. 10 mg/mL gentamicin
- 7.2.11. O<sub>2</sub> Electrolyte solution for DO probe
- 7.2.12. Control serum for glucose and lactate assay
- 7.2.13. Glucose oxidase Assay kit
- 7.2.14. Lactate Assay Kit
- 7.2.15. Glucose standard
- 7.2.16. Lactate standard

## **SOP: Batch Culture of anti-IL-8 Monoclonal Antibody secreting CHO DP-12 Cells**

- 7.2.17. 100 mL and 250 mL graduated cylinder
- 7.2.18. Sterile serological pipets (2mL, 5mL, 25 mL, and 50mL)
- 7.2.19. Pipette aid
- 7.2.20. Spectrophotometer UV/Vis cuvettes
- 7.2.21. Cuvette rack
- 7.2.22. Oakton pH 4.0 and pH7.0 standard buffers
- 7.2.23. 50 mL beakers
- 7.2.24. 50 mL conical tubes
- 7.2.25. Test tube rack
- 7.2.26. 1.5 mL microfuge tubes
- 7.2.27. Microfuge tube holder
- 7.2.28. P20, P200, and P1000 micropipettes and compatible tips
- 7.2.29. Cryogenic vials (1mL capacity) for storage of CHO cell master/working cell bank
- 7.2.30. Sterile 250mL glass bottles for storage of CHO cell media
- 7.2.31. Aluminum foil
- 7.2.32. Autoclave tape

### **8. Procedure:**

**The batch record should be completed step by step by operator of the task and the verifier of the task**

- 8.1. **Preparation of CHO DP-12 Complete Growth Media-** DMEM, 90%; Super Low IgG Fetal Bovine Serum, 10%, 1X Insulin-Transferrin Selenium (ITS-G), 200nM Methotrexate solution.
  - 8.1.1. Prepare biological safety cabinet (BSC) per Labconco Purifier Class 2 Biological Safety Cabinet (BSC) Operation SOP.
  - 8.1.2. Gather the following items, spray with 70% isopropanol, and place in the biological safety cabinet.
    - (1) Pipette aid (wipe with paper dampened with 70% IPA)
    - (2) 5mL sterile pipettes
    - (3) 25mL sterile pipettes
    - (4) 500mL bottle of pre-sterilized DMEM Media
    - (5) 50 mL tube of pre-sterilized, Super Low IgG Fetal Bovine Serum
    - (6) 250 mL sterile 0.22 um filter unit
  - 8.1.3. For 120 mL Complete Growth media :
    - (1) Add 108 mL of DMEM, 12 mL of Super Low IgG FBS, 1.2 mL ITS-G (100X), and 0.12 mL methotrexate (1000X) to the top portion of the filter unit and sterile filter
- 8.2. **Media addition to spinner flask and blank tube**
  - 8.2.1. Obtain 100 mL Bellco spinner flask that has been previously cleaned and autoclaved per SOP, Bellco Spinner Flask (100mL) Cleaning and Autoclaving
  - 8.2.2. Aseptically transfer 98 mL of the prepared Complete Growth Media to the 100mL spinner flask
  - 8.2.3. Aseptically transfer 20 mL of the prepared Complete Growth Media to a sterile 50 mL conical tube
  - 8.2.4. Label the spinner flask as CHO DP12, [date], [group#], [operator initials]. Label the 50 mL conical tube as **BLANK**, [date], [group#],[operator initials]
  - 8.2.5. Place spinner flask and 50 mL conical tube containing CHO cell media in the CO<sub>2</sub>

## SOP: Batch Culture of anti-IL-8 Monoclonal Antibody secreting CHO DP-12 Cells

incubator. Set the speed of the magnetic stirrer to 60 rpm to ensure an even mixing of the culture without foaming. Make sure to loosen side arm caps of spinner flask once in incubator.

8.2.5.1. Verify that the temperature is  $37 \pm 0.5^{\circ}\text{C}$  and percentage of  $\text{CO}_2$  is  $5 \pm 0.5\%$ .

8.2.6. Check media for contamination after a minimum of 24 hours.

### 8.3. Inoculation of Spinner Flask

8.3.1. Prepare Biological Safety Cabinet per BSC SOP.

8.3.2. Spray two 2 mL sterile pipettes with 70% isopropanol and place in the BSC. Wipe the pipette aid with tissue paper dampened with 70% isopropanol.

8.3.3. Remove **two** vials of CHO-DP12 cells from storage in the  $-80^{\circ}\text{C}$  freezer and record removal in the ScienTemp  $-80^{\circ}\text{C}$  Freezer Log. **Each vial should contain between  $5 \times 10^6$ -  $10 \times 10^6$  cells/vial to obtain cell concentration of  $1.8 \times 10^5$ - $2.20 \times 10^5$  cells/mL after inoculation.**

8.3.4. Thaw vials contents rapidly by agitation in a  $37^{\circ}\text{C} \pm 0.5^{\circ}\text{C}$  water bath.

8.3.5. Spray vials, labelled spinner flask and 50 ml conical tube as **BLANK** [operator initials], with 70% isopropanol, and place in the biological safety cabinet.

8.3.6. Aseptically transfer the entire contents of both 1 mL vials of thawed CHO DP12 cells into the Bellco Spinner Flask labeled CHO DP12 [date], [group#], [operator initials] using a 2 mL sterile pipet. **Do not add cells to the 50 mL conical tube labeled BLANK, [date], [group#], [operator initials].**

8.3.7. Swirl to mix. Place the spinner flask on the low speed magnetic stirrer set 60 rpm in the  $\text{CO}_2$  incubator at  $37^{\circ}\text{C}$  with 5%  $\text{CO}_2$  for 10 minutes. Make sure to loosen side arm caps of spinner flask once in incubator. Place the 50 mL conical tube in the  $\text{CO}_2$  at  $37^{\circ}\text{C}$  with 5%  $\text{CO}_2$  for 10 minutes.

8.3.8. Take day 0 samples following the procedure below

### 8.4. Monitoring/Sampling the cell culture

After inoculation, take 3 mL samples of the culture immediately (Day 0, 10 minutes immediately after inoculation) and at specified time points to monitor cell growth and viability and culture conditions. Analyze samples from each time point using tests for: (1) optical density at 650 nm, (2) pH, (3) viable cell count (trypan blue assay), (4) glucose/lactate concentration and (5) anti-IL-8 concentration. Samples will be tested every 24 hrs  $\pm 2$  hrs. until the cell density of  $\geq 1 \times 10^6$  cells/mL (**typically day 6**) is reached and the culture can then be inoculated into the bioreactor.

#### 8.4.1. Sampling the Culture

8.4.1.1. Prepare Biological Safety Cabinet per SOP

8.4.1.2. Collect the following items:

- (1) 5- microfuge tubes labeled “ “blank”, “cell count”, “trypan blue”, “microcentrifuge counterbalance” and “anti-IL-8-vessel name, day of culture, group initials, date”
- (2) 1- microfuge tube holder
- (3) 2 -spectrophotometers cuvettes (1 labeled “Sample” and 1 labeled “Blank”)
- (4) 1-cuvette holder
- (5) 1-P1000 pipette

## **SOP: Batch Culture of anti-IL-8 Monoclonal Antibody secreting CHO DP-12 Cells**

(6) 1-P20 pipette

(7) 1 mL pipette aid

8.4.1.3. Collect the following items, spray with 70% IPA and place in Biological Safety Cabinet:

(1) 15 mL conical tube

(1) Microfuge tube labelled blank

(1) Test tube rack

(2) Pipette aid

(1) 5 mL pipette

(1) 1 mL pipette

8.4.1.4. Remove spinner flask, BLANK 50 mL conical from CO<sub>2</sub> incubator, spray 70% IPA and place in biological safety cabinet

8.4.1.5. Using aseptic technique, remove 3 mL of sample from CHO DP12 labelled Spinner Flask and place into the 15 mL conical tube

8.4.1.6. Using aseptic technique, remove 1 mL from BLANK, [date], [group#], [operator initials] 50 mL conical tube and place into a 1.5 mL microfuge tube labeled blank

8.4.1.7. Return CHO DP-12 labelled Spinner Flask and BLANK 50 mL conical tube to the CO<sub>2</sub> incubator, making sure to loosen side arm caps of spinner flask once in incubator.

### **8.4.2. Testing Culture Samples**

Collect and analyze 3 mL sample from each time point and test each sample for: (1) **optical density at 650 nm**, (2) **viable cell count (trypan blue assay)**, (3) **pH** (4) **glucose and lactate concentration** and (5) **anti-IL-8 concentration**.

8.4.2.1. Mix 3 mL cell suspension by inverting the 15 mL tube several times. Transfer 100µl of cell suspension to the tube labelled cell count.

### **8.4.3. Cell Concentration and Viability**

8.4.3.1 Remove 100 µl of cell suspension from microfuge tube labeled “cell count” and determine cell count and cell viability using Trypan Blue Assay SOP

8.4.3.1.1 Record data in the table provided in the batch record.

### **8.4.4. pH Measurement**

8.4.4.1. Calibrate pH Meter per Oakton PC 700 Bench Series pH/ Conductivity/°C/°F Meter SOP

8.4.4.2. Using the remaining 2.9 mL sample in the 15 mL conical tube take the pH reading per Oakton PC 700 Bench Series pH/ Conductivity/°C/°F Meter SOP.

8.4.4.3. Record pH on data sheet.

### **8.4.5. OD 650 Measurement**

8.4.4.1 Prepare spectrophotometer per SOP

8.4.4.2. Using the same 2.9 mL of sample from step 8.4.4, transfer 1 mL of sample to the cuvette labeled “Sample”. Pipet the sample up and down in the cuvette several times to mix.

8.4.4.3. Transfer the 1 mL Blank from microfuge tube into the cuvette labelled “Blank.”

## SOP: Batch Culture of anti-IL-8 Monoclonal Antibody secreting CHO DP-12 Cells

8.4.4.4. Measure OD reading at 650nm per spectrophotometer SOP. Blank the spectrophotometer using the cuvette with the blank sample. Record reading on the data sheet.

### 8.4.6. Anti-IL-8 concentration, Glucose and Lactate Measurement

8.4.6.1. Remove 1 mL of the remaining 1.9 mL sample and place in the 1.5 mL micro centrifuge tube labelled "cells". Centrifuge in the microcentrifuge for 5 minutes. Make sure to counterbalance the sample microfuge tube with the microcentrifuge tube labeled "microcentrifuge counter balance" containing 1 mL of water.

8.4.6.2. Remove the supernatant from the sample and place in the microfuge tube labeled "anti-IL-8-vessel name, day of culture, group initials, date". Store at 2-8°C in a microfuge tube storage box labeled with Date, Group Name, Vessel Name for measurement of Anti-IL-8 and Glucose and Lactate concentration.

8.4.6.3. Add 10% Bleach solution to the remaining cell suspension and discard in the Biohazard waste

### 8.5. Scale up to 1L bioreactor

Note: When the suspension culture of CHO cells reaches a concentration  $\geq 1 \times 10^6$  cells/mL (typically around day 6), the entire contents of the spinner flask will be added to the bioreactor containing 1L of CHO DP12 Cell Growth Media.

#### 8.5.1. Prepare and autoclave addition/feed bottles

8.5.1.1. Prepare 250 mL alkaline bottle containing 150 mL of 1M  $\text{NaHCO}_3$  in deionized water

8.5.1.1.1.1. Weigh out  $12.6 \pm 0.1$ g of  $\text{NaHCO}_3$  and transfer to a 250 mL beaker.

8.5.1.1.1.2. Using a 250 mL graduated cylinder, measure 100 mL MilliQ water and add to the  $12.6 \pm 0.1$ g of  $\text{NaHCO}_3$  in the beaker. Add a magnetic stir bar and stir on a magnetic stirrer to dissolve.

8.5.1.1.1.3. Transfer dissolved 1M  $\text{NaHCO}_3$  solution to 250 mL graduated cylinder, and bring to 150 mL volume with MilliQ water.

8.5.1.1.1.4. Label the bottle as 1M  $\text{NaHCO}_3$ , [date], [initials], [group number], storage: room temp, disposal: drain.

8.5.1.1.1.5. Transfer 150 mL solution to the labeled 250 mL alkaline feed bottle

8.5.1.1.1.6. Prepare labeled alkaline bottle for bioreactor - add lid and tubing per Applikon ez-Control Bioreactor Controller Operation SOP.

8.5.1.1.2. Prepare 100 mL 1X PBS from 10X PBS stock solution

8.5.1.1.2.1. In a 100 mL graduated cylinder measure 10 mL 10X PBS and bring to 100 mL volume with 90 mL MilliQ water

8.5.1.1.2.2. Add 100 mL of 1X PBS to the Bioreactor vessel. **(NOTE: Do not autoclave the bioreactor with the Complete Growth Media containing FBS).**

8.5.1.1.3. Prepare 1L addition bottle with tubing and autoclavable male connector attached for autoclaving per Applikon ez-Control Bioreactor Controller Operation SOP, steps 8.2.4 )

8.5.1.1.4. Prepare the Applikon bioreactor with attached alkaline bottle for autoclave per Applikon ez-Control Bioreactor Controller Operation SOP ( steps 8.1 and 8.2)

## **SOP: Batch Culture of anti-IL-8 Monoclonal Antibody secreting CHO DP-12 Cells**

- 8.5.1.1.5. Autoclave the Applikon bioreactor containing 100 mL of 1X PBS with alkaline bottle attached. Autoclave 1L addition bottle with tubing and autoclavable male connector attached per the Applikon ez-Control Bioreactor Controller Operation SOP (step 8.2).

### **8.5.2. Prepare bioreactor for Cultivation**

To prepare the bioreactor for cultivation, 1L of Cell Growth Media will be prepared and transferred aseptically via a 1L feed bottle to the bioreactor vessel. After a 24 hour media hold, the media will be inoculated with cells from the spinner flask.

#### **8.5.2.1. Preparation of 1L Cell Growth Media**

- 8.5.2.1.1. Gather the following items, spray with 70% isopropanol, and place in the biological safety cabinet:
- 1-Pipette aid (swab with the tissue papers damped with 70% IPA)
  - 1-10 mL sterile pipette
  - 2-50 mL sterile pipettes
  - 2-500 mL bottle of pre-sterilized DMEM Medium
  - 2-50 mL tube of pre-sterilized, Superlow IgG fetal bovine serum (FBS)
  - 1- 1 mL aliquot of 1000x methotrexate stock solution
  - 1- 10 mL bottle of Insulin-Transferrin Selenium (ITS-G) 100X
  - 1-10 mL bottle of 10mg/mL gentamycin
  - 2 -Empty 50 mL tube
  - 1-autoclaved 1 L addition bottle with tubing and autoclavable male connector attached
- 8.5.2.1.2. Aseptically remove 100 mL from one 500 mL bottle of pre-sterilized DMEM media and place in the empty two 50 mL tubes.
- 8.5.2.1.3. Aseptically add the remaining 400 mL and an additional 500 mL bottle of pre-sterilized DMEM media to the 1L addition bottle with tubing and autoclavable male connector attached.
- 8.5.2.1.4. Aseptically add 100 mL of Superlow IgG FBS to the 1 L addition bottle with tubing and autoclavable male connector attached.
- 8.5.2.1.5. Aseptically add 1 mL of 1000X methotrexate
- 8.5.2.1.6. Aseptically add 10 mL of ITS-G
- 8.5.2.1.7. Aseptically add the 10 mL of 10 mg/mL gentamycin.
- 8.5.2.1.8. Be sure the cap is on tightly and remove the 1 L addition bottle with tubing and autoclavable male connector attached and bring it over to the Applikon bioreactor

#### **8.5.2.2. Preparation of Applikon Bioreactor**

- 8.5.2.2.1. Remove the Applikon bioreactor vessel from the autoclave and prepare the bioreactor for cultivation according to steps 8.3.1 to 8.3.8 of the Applikon ez-Control Bioreactor Controller Operation SOP.
- 8.5.2.2.2. **Addition of media**
- 8.5.2.2.2.1. Carefully remove the foil from the female connector on the addition port of the Applikon bioreactor.
  - 8.5.2.2.2.2. Carefully remove the aluminum foil from the male connector on the 1 L addition bottle and connect the male connector to the female

**SOP: Batch Culture of anti-IL-8 Monoclonal Antibody secreting CHO DP-12 Cells**

- connector on the addition port of the bioreactor.
- 8.5.2.2.2.3. Remove the clamp on the female connector on the addition port of the Applikon bioreactor.
  - 8.5.2.2.2.4. On the Applikon touch screen select Menu > Manual Control > Acid Pump On
  - 8.5.2.2.2.5. As the pump turns feed the tubing around it. Use care to avoid pinching fingers.
  - 8.5.2.2.2.6. Once all of the media has transferred into the vessel turn off the acid pump. On the Applikon touch screen select Menu > Manual Control > Acid Pump Off
  - 8.5.2.2.2.7. Disconnect the male connector of the addition bottle from the female connector on the addition port of the bioreactor. Bend the tubing of the addition port and reattach the clamp.
  - 8.5.2.2.3. Turn on the CO<sub>2</sub> tank. Set the output pressure at 10 psi. on the tank regulator
  - 8.5.2.2.4. Connect the remaining parts of the bioreactor to the controller
  - 8.5.2.2.5. Input the set points and limits listed in the table below per the bioreactor SOP.

Parameter	pH	Temp (°C)	Stirrer (rpm)
Set point	7.2	37	75
Upper Limit	7.3	38	76
Lower Limit	7.1	36	74

- 8.5.2.2.6. When all control loops are at set point begin 24 hours media hold to check for contamination. Turn on the pH, Temperature and Stirrer controller. Refer to step 8.8.9.6 of the Applikon Ez-control bioreactor Controller operation SOP
- 8.5.2.2.7. DO probe polarization
  - 8.5.2.2.7.1. The DO probe should be polarized for a minimum of 6 hours. Polarize DO probe by connecting the probe to the controller.
  - 8.5.2.2.7.2. After minimum of 6 hours of polarization , set DO parameters as follows:

Parameter	%DO
Set point	50
Upper Limit	52
Lower Limit	48

- 8.5.2.2.7.3. After overnight media hold check the media for contamination
- 8.5.2.2.7.4. Turn on the air pump and set the pressure at 10 psi.



## SOP: Batch Culture of anti-IL-8 Monoclonal Antibody secreting CHO DP-12 Cells

8.5.2.2.7.5. Calibrate the DO probe per the Applikon ez-Control Bioreactor Controller Operation SOP (step 8.3.11-8.3.12).

### 8.5.2.3. Cultivation

- 8.5.2.3.1. After 24 hrs. of media hold, check media for contamination.
- 8.5.2.3.2. Inoculate the bioreactor with the cells from the spinner flask by following the steps in section 8.4.1. of the Applikon ez-Control Bioreactor Controller Operation SOP.
- 8.5.2.3.3. Immediately after inoculation (Day 0) and at 24 hr. intervals, sample the culture to determine OD, pH, viable cell count, cell viability, glucose concentration, lactate concentration and concentration of anti-IL-8. (see step 8.7 for Day 0-2 and step 8.8 for Day 3-End Of Run). Record the data in the batch record.

### 8.6. Bioreactor Sampling/Monitoring

As in previous steps with the spinner flask, after inoculation take samples of the culture in the bioreactor immediately (Day 0, 10 minutes immediately after inoculation) and at specified time points to monitor cell growth and viability and culture conditions. Analyze samples from each time point using tests for: (1) optical density at 650 nm (2) viable cell concentration (trypan blue assay), (3) glucose/lactate concentration and (4) anti-IL-8 concentration. Samples should be taken daily until the cell density of  $\geq 1 \times 10^6$  cells/mL (typically day 6) is reached. At this cell concentration, the cells in the bioreactor can be harvested. **Note: In order to obtain accurate cell concentration and OD readings for Day 0-2, 25 mL samples will be taken** and 5 mL samples will be taken for the later time points (Day 3-End of Run)

#### 8.6.1. Sampling Procedure: Day 0-2

8.6.1.1. For each time point- label:

- 2 -spectrophotometer cuvettes as “blank” and “sample”
- 1- microfuge tube “anti-IL-8- bioreactor- time point- initials, date”
- 1 microfuge tube labelled ‘Blank’

8.6.1.2. Aseptically transfer 1 mL of the blank solution to a microfuge tube labelled blank.

8.6.1.3. Log in to Applikon EZ Controller as operator per Applikon Operator SOP

8.6.1.4. Raise the stirrer upper limit to 150 rpm.

8.6.1.5. Change the stirrer setting to 125 rpm.

8.6.1.6. Spray the head plate near the sampling tube with 70% IPA.

8.6.1.7. Remove the black clamp and set on the head plate.

8.6.1.8. Pull out the autoclavable female connector and set it next to the black clamp.

8.6.1.9. Place a 25 mL pipette into the sampling tube, remove 25 mL of sample and place sample in a 50 mL conical tube

8.6.1.10. Put the female autoclavable connector back into the sampling tube.

8.6.1.11. Bend the sampling tubing and place the black clamp back on the tubing.

8.6.1.12. Change the stirrer setting to 75 rpm.

8.6.1.13. Change the stirrer upper limit back to 76 rpm

## **SOP: Batch Culture of anti-IL-8 Monoclonal Antibody secreting CHO DP-12 Cells**

### **8.6.2. Testing Culture Samples: Day 0- Day 2**

#### **8.6.2.1. OD 650 Measurement**

- 8.6.2.1.1. Remove 1 mL of sample from the 50 mL conical tube and place in spectrophotometer cuvette labeled “sample”
- 8.6.2.1.2. Remove 1 mL of the blank solution and place in the spectrophotometer cuvette labelled “Blank”
- 8.6.2.1.3. Measure OD at 650 nm and return 1 mL sample back to the 50 mL conical tube. Record the OD in the table of the Batch Record.

#### **8.6.2.2. Cell Concentration and Viability –Trypan Blue Assay**

- 8.6.2.2.1. Centrifuge the 50 mL tube containing sample at 900 rpm for 5 minutes.
- 8.6.2.2.2. Carefully remove supernatant, leaving approximately 0.2 mL behind so as not to disturb the pellet. Transfer supernatant to a new 15 mL conical tube
- 8.6.2.2.3. Re-suspend the pellet in 0.8 mL of excess supernatant from step 8.6.2.2.2 using a 5 mL pipette.
- 8.6.2.2.4. Perform the trypan blue assay per SOP on the re-suspended pellet. Record the viable cells/mL and % Viability in the table of the Batch Record.

#### **8.6.2.2.5. Anti- IL-8, Glucose, Lactate concentration**

- 8.6.2.2.5.1. Remove 1 mL of supernatant from 15 mL conical tube in step 8.6.2.2.2 and transfer to a microfuge tube labeled “anti-IL-8- bioreactor- time point- initials, date” Remove the supernatant from the sample and place in the microfuge tube labeled “anti-IL-8-vessel name, day of culture, group initials, date”. Store at 2-8°C in a microfuge tube storage box labeled with Date, Group Name, Vessel Name for measurement of Anti-IL-8 and Glucose and Lactate concentration.

### **8.6.3. Sampling Procedure: Day 3-End of Run (EOR)**

- 8.6.3.1 Aseptically transfer 1 mL of the Blank solution to the microfuge tube labelled “Blank”
- 8.6.3.2 Log in to Applikon EZ Controller as operator per Applikon Operator SOP
- 8.6.3.3. Raise the stirrer upper limit to 150 rpm.
- 8.6.3.4. Change the stirrer setting to 125 rpm.
- 8.6.3.5. Spray the head plate near the sampling tube with 70% IPA.
- 8.6.3.6. Remove the black clamp and set on the head plate.
- 8.6.3.7. Pull out the autoclavable female connector and set it next to the black clamp.
- 8.6.3.8. Place a 5 mL pipette into the sampling tube and remove **5 mL** of sample and place in a 15 mL conical tube.
- 8.6.3.9. Put the female autoclavable connector back into the sampling tube.
- 8.6.3.10. Bend the sampling tubing and place the black clamp back on the tubing
- 8.6.3.11. Change the stirrer setting to 75 rpm
- 8.6.3.12. Change the stirrer upper limit back to 76 rpm

### **8.6.4. Testing Culture Samples Day 3- End of Run (EOR)**

#### **8.6.4.3. OD 650 measurement**

- 8.6.4.3.1. Remove 1 mL of sample from the 15 mL conical tube containing 5 mL sample and place in spectrophotometer cuvette labeled “sample”
- 8.6.4.3.2. Transfer 1 mL of the blank solution to the spectrophotometer cuvette

## **SOP: Batch Culture of anti-IL-8 Monoclonal Antibody secreting CHO DP-12 Cells**

labelled “Blank”

8.6.4.3.3. Measure OD at 650 nm and record the data in the table of the Batch Record

### **8.6.4.4. Cell Concentration and Viability – Trypan Blue Assay**

8.6.4.4.1. Remove 0.1 mL of the sample from 15 mL conical tube containing the 5 mL sample and perform the trypan blue assay per SOP

### **8.6.4.5. Anti- IL-8, Glucose, Lactate concentration**

8.6.4.5.1. Centrifuge the remaining sample at 900 rpm for 5 minutes

8.6.4.5.2. Remove 1 mL of supernatant and transfer to microfuge tube labeled “anti-IL-8- bioreactor- time point- initials, date” Remove the supernatant from the sample and place in the microfuge tube labeled “anti-IL-8-vessel name, day of culture, group initials, date”. Store at 2-8°C in a microfuge tube storage box labeled with Date, Group Name, Vessel Name for measurement of Anti-IL-8 and Glucose and Lactate concentration.

## **8.7. End of Run – Culture Harvest**

When the cell culture reaches the cell density of  $\geq 1 \times 10^6$  cells/mL (typically Day 6) of the run, the cells are harvested

8.7.3. To harvest cells, disconnect bioreactor the controller by following the steps 8.6.1, 8.6.2 and 8.7.1 of the Applikon ez-Control Bioreactor Controller Operation SOP.

8.7.4. Transfer cell suspension to the 250 mL centrifuge bottles.

8.7.5. Centrifuge cells in pre-chilled Sorvall centrifuge, fitted with a SLA1500 rotor, at 500 x g for 5 min, 4 degrees C.

8.7.6. Transfer conditioned medium (CM) from centrifuge bottle to storage vessel/bottle by carefully decanting the supernatant to appropriately labeled 250 mL Corning bottles for further processing.

8.7.7. Clean bioreactor following steps 8.7.2, 8.7.3, 8.7.4 and 8.7.5 of the Applikon ez-Control Bioreactor Controller Operation SOP

## **8.8. Determine Glucose, Lactate, and IL-8 concentration**

8.8.3. Determine the glucose concentration of all the samples collected from the spinner flask and Bioreactor per the Glucose Determination Assay SOP.

8.8.4. Determine the lactate concentration of all the samples collected from the spinner flask and Bioreactor per the Lactate Determination Assay SOP

8.8.5. Determine the anti-IL-8 Mab concentration of all the samples collected from the spinner flask and Bioreactor per the Quantitation of CHO DP-12 derived Mouse anti-Human IL-8 Monoclonal Antibody by ELISA SOP.

## **8.9. Prepare Growth Curves**

8.9.3. Plot OD, pH, viable cells, glucose, lactate, and tPA vs. time (use 2 y-axes).

8.9.4. Attach growth curve to Batch Record.

8.9.5. Determine growth rate and doubling time of the 100 mL spinner flask and 1L bioreactor cultures.

8.9.6. Attach calculations to Batch Record

## **9. Attachments:**

9.6. Data table

**SOP: Batch Culture of anti-IL-8 Monoclonal Antibody secreting CHO DP-12 Cells**

**10. History:**

Name	Date	Amendment
Hetal Doshi & Cianna Cooper	19MAR2017	Initial Write-up

