Regulated Research Institutional/Industrial Setting Form (1C)

This form must be completed AFTER experimentation by the adult supervising the student research conducted in a regulated research institution, industrial setting or any work site other than home, school or field.

Student's Name(s) Sumaiyah Khwaja

Title of Project Enhanced Mitochondrial Reductive Stress and Cell Death Observed Via the Synergistic Effect of Glucose Starvation and Ceftriaxone/N-acetylcysteine Treatment on Human Glioma Cells

To be completed by the Supervising Adult in the Setting (NOT the Student(s)) after experimentation:
(Responses must be on the form as it is required to be displayed at student's project booth; please do not print double-sided.)

The student(s) conducted research at my work site:

1. Did you or your proxy (e.g. graduate student, postdoc, employee) mentor or provide substantial guidance to the student researcher? ☑ Yes ☐ No
   a. If no, describe your and/or your institution's role with the student researcher and his/her project (e.g. supervised use of equipment on site without ongoing mentorship and sign below.

   b. If yes, complete questions 2 – 5.

2. Is the student's research project a subset of your ongoing research or work? Use questions 3, 4 and 5 to detail how the student's project was similar and/or different from ongoing research or work at your site. ☑ Yes ☐ No

3. Describe the independence and creativity with which the student:
   a. developed the hypotheses or engineering goals for the research project

      I provided Sumaiyah with primary literature (my own papers and others from the literature) to develop a hypothesis for her experiments. She synthesized the data from the papers and developed the specific hypotheses that she tested in the studies in the lab.

   b. designed the methodology for his/her research project

      Sumaiyah built on methodologies already available in the laboratory. To test her hypothesis that glucose transporter membrane localization was altered by N-acetylcysteine and Ceftriaxone treatment, she used cell fractionation techniques to separate cytoplasmic versus membrane-bound proteins before performing western blot. Though I designed the methodology, she revised it and implemented the western blot technique. I advised her on these techniques and helped her troubleshoot the western blot results. For the lactate measurement assay, I designed the general methodology, but she made slight edits in several steps regarding timing of centrifugation.

   c. analyzed and interpreted data

      For both the western blot and lactate assays, Sumaiyah worked on analyzing the data. Though I provided feedback through this process, Sumaiyah understood the experiment and developed logical conclusions from the results (namely that glucose transporter localization was regulated by Ceftriaxone and N-acetylcysteine treatment of glioblastoma cells, and likewise, that lactate concentrations weren't altered by this treatment). She also helped in figure preparation from this data.

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Regulated Research Institutional/Industrial Setting Form (1C) Continued

Student's Name(s) Sumaiyah Khwaja

4. Detail the student's role in conducting the research (e.g. data collection, specific procedures performed). Differentiate what the student observed and what the student actually did.

Sumaiyah first began by observing western blots performed by myself and a technician. Then, she independently performed all of the steps of the western blot, including protein fractionation, quantification, preparation of samples for loading, sample loading, running, transferring, blocking, antibody incubation, and development. She took pictures of the developed blots and helped to prepare figures.

For the lactate assay, she used an established protocol in our lab. She assisted minimally with this protocol, completing several steps, such as pipetting reagents, and observed most of the other steps. She analyzed the data and provided me with her conclusions from this study.

For the metabolic flux assay, she fully observed this study and did not perform any of the procedures for the assay. However, she thoroughly read the protocol and exhibited understanding of the experimental approach and technique involved in the assay. I reviewed the data with her after the assay, and she interpreted the data to form a conclusion on the effects of N-acetylcysteine and Ceftriaxone on mitochondrial oxygen consumption measured by the assay.

5. Did the student(s) work on the project as part of a group? ☑ Yes ☐ No
If yes, how many individuals were in the group and who were they (e.g. high school students, graduate students, faculty, professional researchers)?

Sumaiyah worked with me (Instructor in Neurology) and a technician (recently completed undergraduate training) who was working with me.

I attest that the student has conducted the work as indicated above and that any required review and approval by institutional regulatory board (IRB/IACUC/IBC) has been obtained. Copies are attached if applicable.
I further acknowledge that the student will be presenting this work publicly in competition and I have communicated with the student research regarding any requirements for my review and/or restrictions of what is publicized.

Evan Noch	Evan K. Noch	Instructor
Supervising Adult's Printed Name	Signature	Title
Weill Cornell Medicine		01/22/2020
Institution		Date Signed (must be after experimentation) (mm/dd/yy)
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Address		Email/Phone