OVERVIEW

The objective is to learn cell/molecular biology methodology in the format of a research project. The research project encompasses sequential experiments that incorporate fundamental and current techniques including in-vitro assays; and cell based assays encompassing tissue culture procedures; cell toxicity; apoptosis; immunocytochemistry, SiRNA, promoter-reporter plasmids, mRNA isolation, polymerase chain reaction, gel electrophoresis; ELISA and western blotting.

The laboratory starts with laying the groundwork and is followed by the research project. Laying the groundwork is the discussion of the laboratory research project and the basic laboratory technical skills of pipetting, weighing, molarity, % solutions, microscopes, cell culture process, cell counting, cell seeding calculations, serial dilutions, data analysis and representation. The research project, following groundwork and enzyme kinetics experiment for data analysis/representation, is largely on the regulation of apoptosis/involved genes by oxidant/antioxidant or SiRNA/promoter-reporter plasmid in cancer cells.

Each of the experiments within the research project will have three phases; preparation, experimental, data analysis (EXCEL), notebook recording of experiment with emphasis on objective, material used, method, data as a table and a figure, results, and discussion. The information from the notebooks will be synthesized into three formal laboratory reports that will be presented in class. Problem solve tests will coincide with the formal laboratory reports.

The final part of the laboratory is the comprehensive presentation of laboratory research as a journal-style article and an oral power-point presentation. The journal-style article includes the following sections, in the style/format of the selected journal: Informative title; Abstract: concise summary; Introduction: to provide adequate background to hypothesis/rationale; Materials and Methods: brief summary of procedure; Results: state results of data presented as tables or figures; Discussion: analyze results in relation to background, hypothesis and rationale and References: Cite sources The comprehensive presentation will summarize the research project with an informative title, brief background leading to objective and rationale, tables/graphs with informative titles, and a discussion/inference that ties the experiments. The goal is to connect the experiments, work in groups, and enjoy the process.
TENTATIVE SCHEDULE

Jan 30:   Lab 1 – Introduction; Cell Culture
Feb 6:    Lab 2 – Enzyme Inhibition; Protein Assay
Feb 13:   Lab 3 – Seeding Cells; Transfecting Cells; Harvest Cells/MTS assay
Feb 20:   Lab Report/Lab Presentation 1
            Lab 4 – Cell Lysis; ELISA
Feb 27:   Lab 5 – SDS-PAGE electrophoresis; Cellular Toxicity
Mar 5:    Lab 6 - Western Blotting; Data analysis/discussion
Mar 12:   Lab Report/Lab Presentation 2
            Lab 7 – RNA Extraction
Mar 19:   SPRING BREAK
Mar 26:   Lab 8 - Gel electrophoresis; Northern blotting
Apr 2:    Lab 9 - RT-PCR
Apr 9:    Lab Report/Lab Presentation 3
            Lab 10 - Apoptosis
Apr 16:   Lab 11 – ROS Inhibition
Apr 23:   Lab 12- Annexin V-FITC, cytochemistry
Apr 30:   Comprehensive presentation and paper

GRADING (Lab)

Lab reports, Presentations, and Problem solves:  30 points
Comprehensive presentation and manuscript:      10 points

ASSESSMENT:

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<thead>
<tr>
<th>I.</th>
<th>Knowledge of Concepts</th>
<th>12%</th>
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<tr>
<td>II.</td>
<td>Technical Skills and Data Analysis</td>
<td>6%</td>
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<td>III.</td>
<td>Synthesis</td>
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<td>IV.</td>
<td>Communication</td>
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<tr>
<td>V.</td>
<td>Comprehensive Presentation</td>
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<td>VI.</td>
<td>Comprehensive Paper</td>
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OUTCOME:

(1) Cellular molecular biology techniques: in-vitro assays; and cell based assays encompassing tissue culture procedures; cell toxicity; apoptosis; transfection of SiRNA, and promoter-reporter plasmids, mRNA isolation, polymerase chain reaction, gel electrophoresis; ELISA and western blotting.
(2) Simulation of research investigation in the application of techniques
(3) Scientifically thinking and problem solving thinking
(4) Experimental planning
(5) Data analysis, EXCEL expertise, graphing, interpretation
(6) Comprehensive synthesis of experiments into a manuscript
(7) Effective communication of research project with reasoning
(8) A guide to a research laboratory, graduate research, industry/biotechnology, medicine or allied health profession.