



Teaching and Learning Innovation Expo 2010

e-Learning platform for Biochemical Science

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Background of the project

- ✓ Named “**e-Learning platform for Biochemical Science**”
- ✓ A continuum of the previous project, “e-platform for Biochemistry courses”
- ✓ on Moodle

e-platform for Biochemistry courses	e-Learning platform for Biochemical Science
Main focus: Lab techniques	Emphasis: Integration of the biochemical knowledge that students acquired in their studies
Style: Tailor-made videos of some sophisticated lab techniques with concise description bundled	Style: Integrated learning modules with different elements

Features of the new e-Learning platform

✓ In modular form

Advantages:

- Better suit the learning content and progress of students' formal classroom study
- Easier for the eLearning platform to be expanded

✓ Increased learning elements

- Text description on the topic background
- Case study on different topics
- Interactive course content, includes games and quizzes
- Multimedia sources, e.g. videos and animations

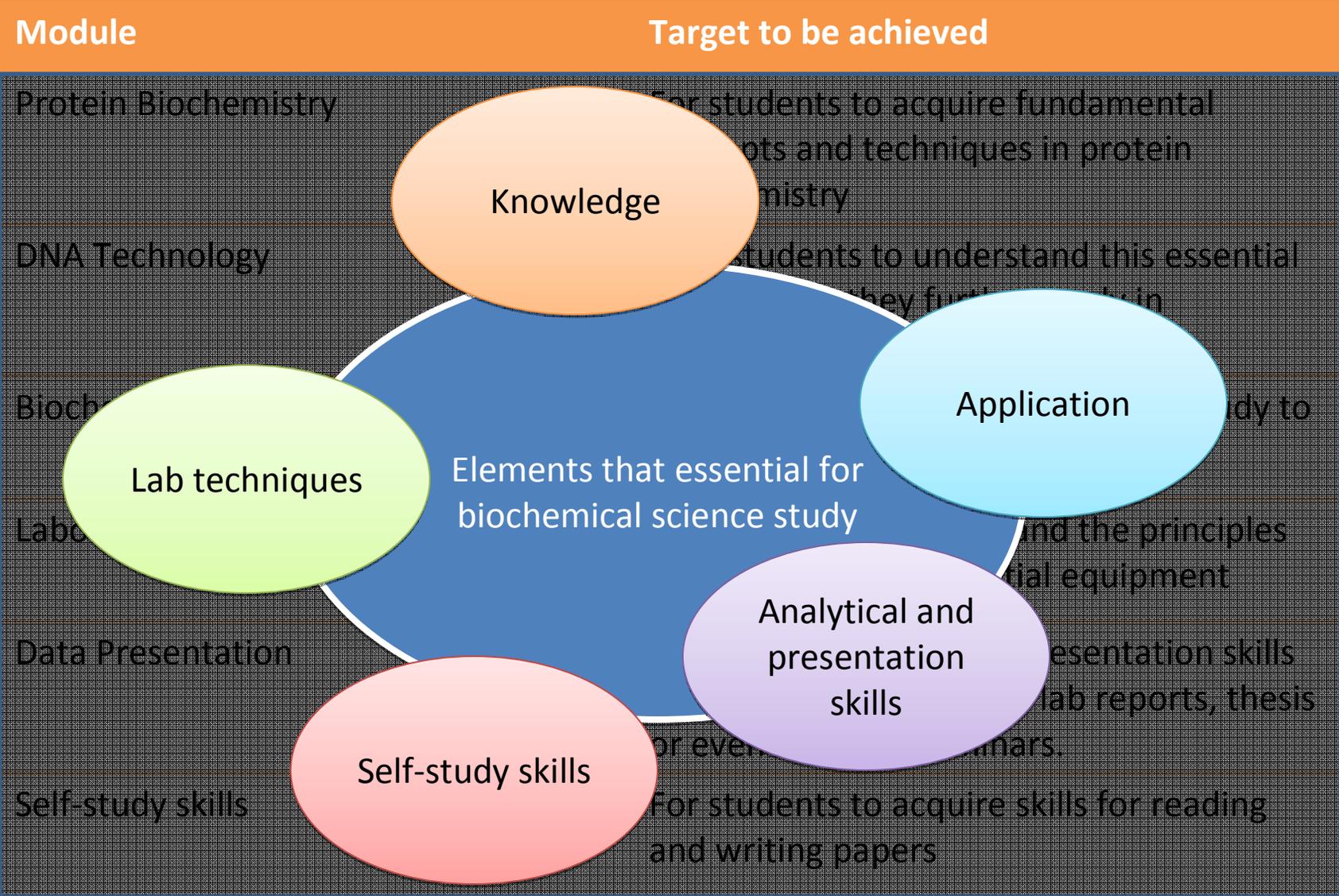
✓ Cross-links between modules for integrative learning

✓ Indicated with related course codes for students' reference

Modular form – Six Learning Modules

- Protein Biochemistry Module
- DNA Technology Module
- Biochemistry and Life Module
- Laboratory Equipment and Techniques Module
- Data Presentation Module
- Self-study skills Module

A comprehensive design of the modules content



Our Approach

- More interactive
- Clearer illustration on abstract topics
- More emphasis on the daily life applications of the biochemical knowledge
- More integration between different topics



More interactive

Self-study skills Module – The way to read a scientific paper

Objective
To study the direct effect of tumor necrosis factor- α (TNF- α) in stimulating or inhibiting the growth of C2 glioma cells, with different TNF- α concentrations and inhibition by measuring the activity of Thymidine incorporated into the cells using ³H-thymidine incorporation counts.

1.1 Introduction
1.1.1 Design Introduction of TNF
Tumor necrosis factor (TNF) has 2 types of receptors involved in the regulation of immune cells and other processes, such as proliferation, induction, apoptosis, inhibition of angiogenesis and cell adhesion. These active types of TNF...
1.1.2 Inhibitor of tumor necrosis by TNF
TNF- α is synthesized as a 212 amino acid type 2 transmembrane protein...
1.1.3 Role of TNF in the central nervous system
TNF- α can be produced as a soluble homotrimer...
1.1.4 Role of TNF in glioma cells
TNF- α is a secreted protein...
1.1.5 Role of TNF in glioma cells
TNF- α is a secreted protein...
1.1.6 Role of TNF in glioma cells
TNF- α is a secreted protein...

1.2 Materials and Methods
1.2.1 Cell Culture
C2 glioma cells were cultured in DMEM...
1.2.2 Thymidine Incorporation Assay
Cells were incubated with ³H-thymidine...
1.2.3 Data Analysis
The amount of ³H-thymidine incorporated...
1.2.4 Statistical Analysis
Data were analyzed using Student's t-test...

1.3 Results
1.3.1 Effect of TNF- α on C2 glioma cells
TNF- α treatment significantly increased the proliferation of C2 glioma cells...
1.3.2 Effect of TNF- α on C2 glioma cells
TNF- α treatment significantly increased the proliferation of C2 glioma cells...
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1.4 Discussion
Our results show that TNF- α treatment significantly increased the proliferation of C2 glioma cells...
1.5 Conclusion
TNF- α treatment significantly increased the proliferation of C2 glioma cells...

Research Writing Skills

Preparation Work (P)

- Get clear idea of research question:
 - Review articles in the topic area to get an overview of the field
 - Read widely and critically
 - Keep data well, organize it once after finished some work rather than leaving it till the end.
 - Be focus driven, not data driven. Set a clear plan on how to use the data collected.

Writing

Introduction (I)

Elements should be included in a good introduction:

- Relevant background information
- Key terms definition if necessary
- Identification of contentious issue or problem to be discussed
- Overall purpose of the research
- Clear and specific thesis statement
- Rational of the way studying the research question

Methodology (M)

- Describe each step clearly and comprehensively
- Ensure the methodology is valid

Results (R)

- Point out the major finding
- Place graphical or tabular data in an appropriate place in the text and clearly to convey the results
- Present enough of data for the reader to judge how the experiment turned out
- Emphasize the patterns or trends in the data
- Point of the significance of the results

Discussion (D)

- Draw convincing conclusions from the data
- Factors that could have influenced, or accounted for the results
- Further planning or experiments to continue the research
- State your contribution on the paper

Language tips

Style and Tone

Use academic sentence structures and academic vocabulary (e.g. Although X, Y therefore Z.)

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1.6 Appendix
1.6.1 Table 1
Table showing the effect of TNF- α on C2 glioma cells proliferation. The table shows that TNF- α treatment significantly increased the proliferation of C2 glioma cells...
1.6.2 Table 2
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1.6.3 Table 3
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The way to read a scientific paper

- Students can choose the samples that match the criteria

- Approach
- Interactive
- Illustration
- Application
- Integration

The Alterative effects of doxorubicin gene and black tea

Green Tea Compound
Epigallocatechin gallate and Epigallocatechin gallate and Catechin have been shown to have anticancer effects on various cell lines.

Human cells: HepG2 Human epidermal carcinoma cells (cell line A431), human carcinoma keratinocytes (cell line HaCat), human prostate carcinoma cells (cell line PC14), mouse lymphoma cells (cell line L1210), and normal human epidermal keratinocytes (NHK) were used. Apoptosis activity.

Key 3: a report to see that naturally occurring 3,3'-diindolylmethane (DIM) is the active ingredient of cruciferous vegetables. DIM is a potent inducer of phase II detoxification enzymes and has been shown to be effective in the prevention of cancer. The use of DIM in the present study was to compare the effects of DIM with those of EGCG.

Conclusion: DIM and EGCG both induced apoptosis in a concentration-dependent manner. While DIM was more effective than EGCG in inducing apoptosis in the human epidermal carcinoma cells (A431), EGCG was more effective in inducing apoptosis in the mouse lymphoma cells (L1210).

Green and black tea also induced DNA induced four additional multiplexed. While there was a significant level of induction.

Conclusion: The present results showed that both black tea and green tea induced apoptosis activity against A431, L1210, HaCat and PC14 cells. Therefore, we suggest that both black tea and green tea may be used as chemopreventive agents in the prevention of cancer.

Detection of DNA Fragmentation Induced by Green Tea Compounds and Its Individual Constituents

The formation of internucleosomal DNA fragments (Fig. 1, A, lanes 1-3) was observed with the black-tea compound (Fig. 1, A, lane 1). The green tea polyphenols, epigallocatechin gallate (EGCG) and epigallocatechin gallate (EGCG) induced an induction of apoptosis of the cells (Fig. 1, A, lanes 2-4, respectively). Among the individual constituents present in green tea polyphenols, epigallocatechin gallate, epigallocatechin gallate, and epigallocatechin gallate induced an induction of apoptosis in A431 cells at a dose of 40 µg/ml. Individual epigallocatechin gallate and epigallocatechin gallate did not show such effect (Fig. 1, A).

Detection of Apoptosis by Confocal Microscopy

The induction of apoptosis by epigallocatechin-3-gallate was also evident from the morphologic alterations as shown by confocal microscopy after labeling the cells with SYTO 15 (Fig. 2).

Quantification of Apoptosis by Flow Cytometry

We used a quantitative method of apoptosis by flow cytometry analysis of the cells labeled with doxorubicin, epigallocatechin gallate and epigallocatechin gallate. Since this is a quantitative procedure to measure the extent of apoptosis, for this experiment we used a quantitative method of apoptosis by flow cytometry analysis of the cells labeled with doxorubicin, epigallocatechin gallate and epigallocatechin gallate. Since this is a quantitative procedure to measure the extent of apoptosis, for this experiment we used a quantitative method of apoptosis by flow cytometry analysis of the cells labeled with doxorubicin, epigallocatechin gallate and epigallocatechin gallate.

Figure 1: Induction of internucleosomal DNA fragments in A431 cells. A431 cells were treated with doxorubicin (40 µg/ml) or EGCG (40 µg/ml) for 24 h. The induction of internucleosomal DNA fragments was measured by agarose gel electrophoresis and ethidium bromide staining. Lane 1: control; lane 2: doxorubicin; lane 3: EGCG; lane 4: EGCG + doxorubicin. The induction of internucleosomal DNA fragments was observed in lanes 2, 3, and 4. Lane 4 shows a more pronounced induction of internucleosomal DNA fragments compared to lanes 2 and 3.

Figure 2: Induction of apoptosis in A431 cells. A431 cells were treated with doxorubicin (40 µg/ml) or EGCG (40 µg/ml) for 24 h. The induction of apoptosis was measured by confocal microscopy after labeling the cells with SYTO 15. The induction of apoptosis was observed in lanes 2 and 3. Lane 3 shows a more pronounced induction of apoptosis compared to lane 2.

Figure 3: Induction of apoptosis in A431 cells. A431 cells were treated with doxorubicin (40 µg/ml) or EGCG (40 µg/ml) for 24 h. The induction of apoptosis was measured by flow cytometry analysis of the cells labeled with doxorubicin, epigallocatechin gallate and epigallocatechin gallate. The induction of apoptosis was observed in lanes 2 and 3. Lane 3 shows a more pronounced induction of apoptosis compared to lane 2.

Figure 4: Induction of apoptosis in A431 cells. A431 cells were treated with doxorubicin (40 µg/ml) or EGCG (40 µg/ml) for 24 h. The induction of apoptosis was measured by flow cytometry analysis of the cells labeled with doxorubicin, epigallocatechin gallate and epigallocatechin gallate. The induction of apoptosis was observed in lanes 2 and 3. Lane 3 shows a more pronounced induction of apoptosis compared to lane 2.

Figure 5: Induction of apoptosis in A431 cells. A431 cells were treated with doxorubicin (40 µg/ml) or EGCG (40 µg/ml) for 24 h. The induction of apoptosis was measured by flow cytometry analysis of the cells labeled with doxorubicin, epigallocatechin gallate and epigallocatechin gallate. The induction of apoptosis was observed in lanes 2 and 3. Lane 3 shows a more pronounced induction of apoptosis compared to lane 2.

Figure 6: Induction of apoptosis in A431 cells. A431 cells were treated with doxorubicin (40 µg/ml) or EGCG (40 µg/ml) for 24 h. The induction of apoptosis was measured by flow cytometry analysis of the cells labeled with doxorubicin, epigallocatechin gallate and epigallocatechin gallate. The induction of apoptosis was observed in lanes 2 and 3. Lane 3 shows a more pronounced induction of apoptosis compared to lane 2.

Figure 7: Induction of apoptosis in A431 cells. A431 cells were treated with doxorubicin (40 µg/ml) or EGCG (40 µg/ml) for 24 h. The induction of apoptosis was measured by flow cytometry analysis of the cells labeled with doxorubicin, epigallocatechin gallate and epigallocatechin gallate. The induction of apoptosis was observed in lanes 2 and 3. Lane 3 shows a more pronounced induction of apoptosis compared to lane 2.

Figure 8: Induction of apoptosis in A431 cells. A431 cells were treated with doxorubicin (40 µg/ml) or EGCG (40 µg/ml) for 24 h. The induction of apoptosis was measured by flow cytometry analysis of the cells labeled with doxorubicin, epigallocatechin gallate and epigallocatechin gallate. The induction of apoptosis was observed in lanes 2 and 3. Lane 3 shows a more pronounced induction of apoptosis compared to lane 2.

Figure 9: Induction of apoptosis in A431 cells. A431 cells were treated with doxorubicin (40 µg/ml) or EGCG (40 µg/ml) for 24 h. The induction of apoptosis was measured by flow cytometry analysis of the cells labeled with doxorubicin, epigallocatechin gallate and epigallocatechin gallate. The induction of apoptosis was observed in lanes 2 and 3. Lane 3 shows a more pronounced induction of apoptosis compared to lane 2.

Figure 10: Induction of apoptosis in A431 cells. A431 cells were treated with doxorubicin (40 µg/ml) or EGCG (40 µg/ml) for 24 h. The induction of apoptosis was measured by flow cytometry analysis of the cells labeled with doxorubicin, epigallocatechin gallate and epigallocatechin gallate. The induction of apoptosis was observed in lanes 2 and 3. Lane 3 shows a more pronounced induction of apoptosis compared to lane 2.

Matching games

A.	Whether the data actually support the conclusions made by the author
B.	Whether the author take multiple approaches to answering a question. Usually, multiple approaches from different direction to support the conclusion would make it more persuasive.
C.	Be aware of the application of the study in the field
D.	Distinguish between conclusions proven by experimental data and speculations
E.	Whether the paper carry out comparison between similar subjects to provide substitutes

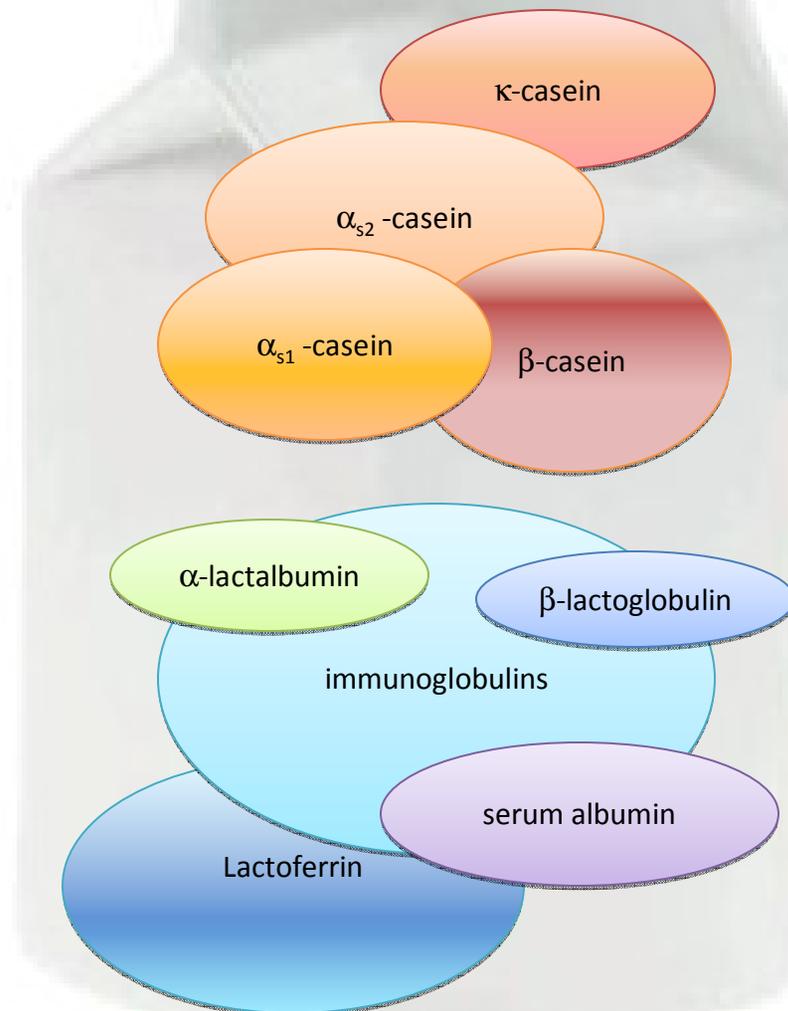
Clearer illustration on abstract topics

Protein Biochemistry Module

Milk protein separation case study

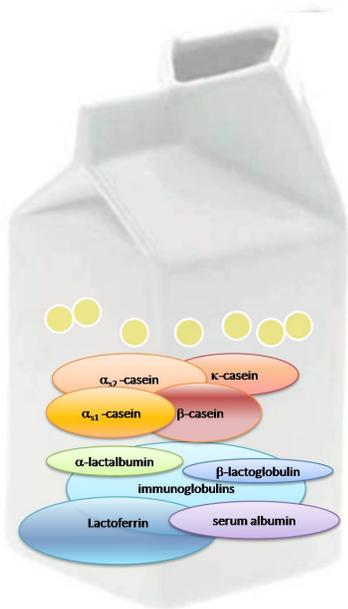
✓ Illustrate the way to separate different proteins and to arrange the proteins according to sizes

(showing the **phenomena** of centrifugation and SDS-PAGE)



Games

Organize the position of molecules after **centrifugation**

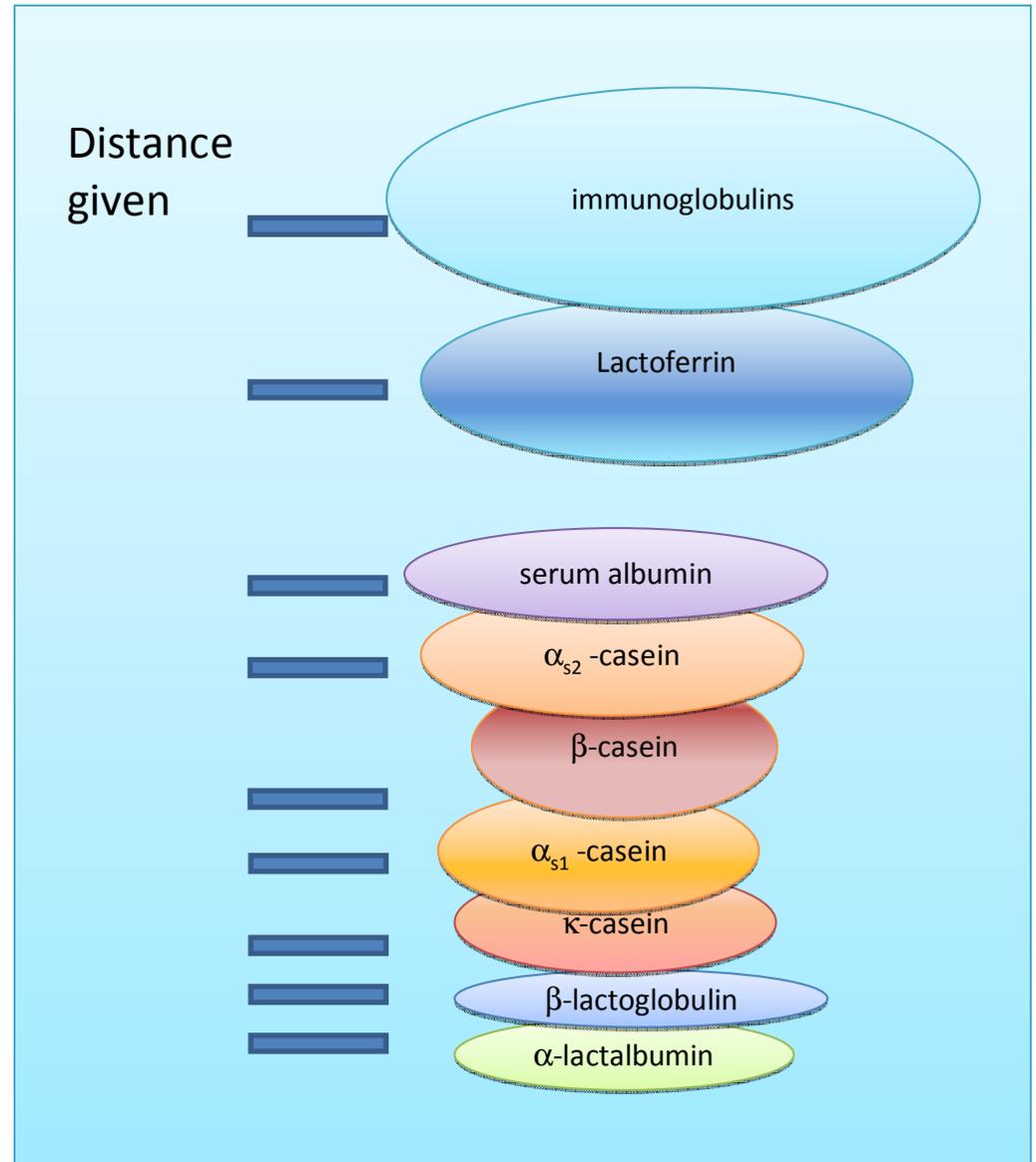


Removal of fat from the sample



SDS-PAGE

Label the bands of corresponding milk proteins after SDS-PAGE experiment



More emphasis on the daily life applications of the biochemical knowledge

Biochemistry and Life Module

Effect of tea antioxidants on lipid oxidation in red blood cell membrane

基因研究證實綠茶抗癌說法

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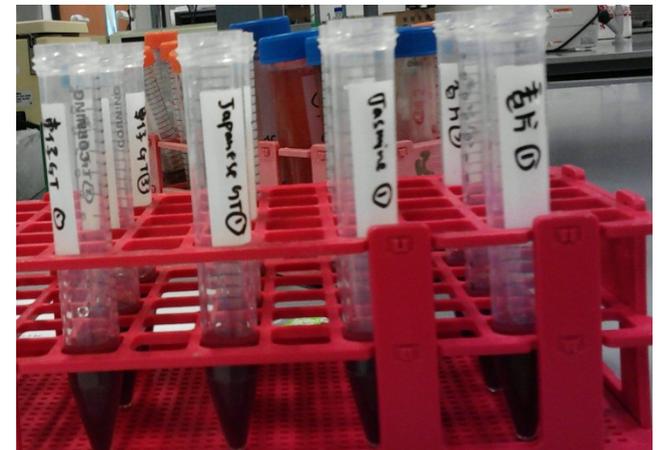
來源：文匯報



Case study:

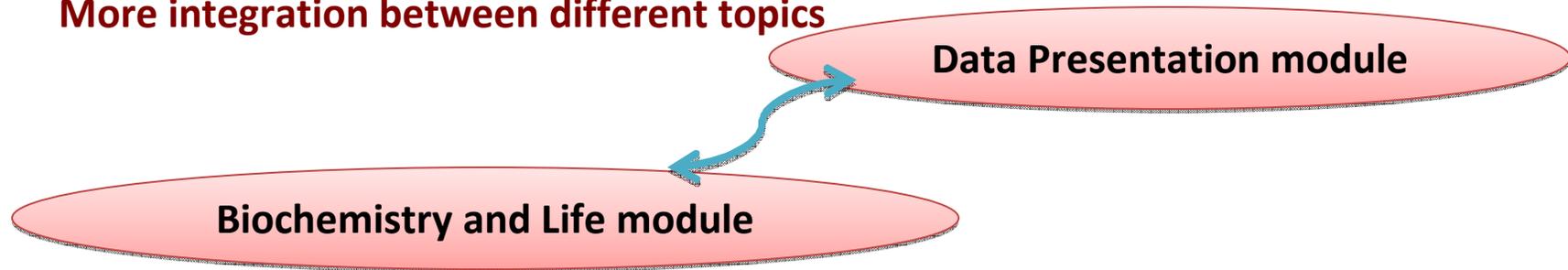
- Test effect green tea on red blood cell membrane lipid oxidation
- Compare effect of green tea with black tea
- Compare different brands of green tea

➤ Embedded with videos of all the related experiments





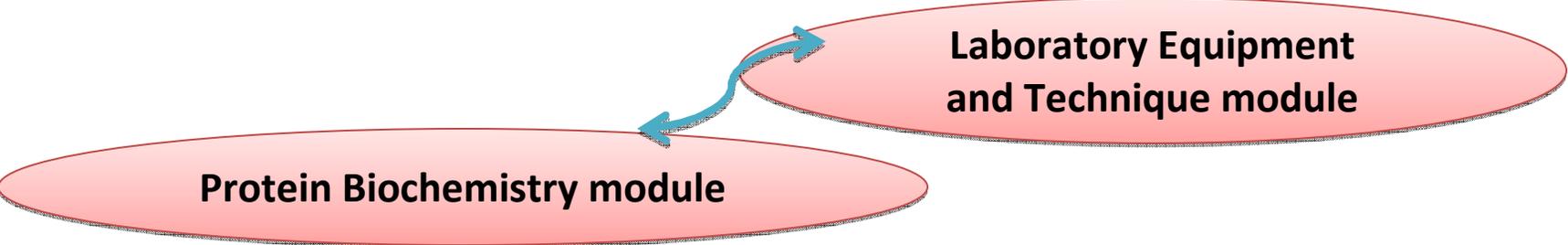
More integration between different topics



Case study:

- Test effect green tea on red blood cell membrane lipid oxidation
- Compare effect of green tea with black tea
- Compare different brands of green tea

More integration between different topics



Bradford

Determination of protein concentration in milk

Separation of proteins
Determination of proteins molecular weight

...E technique can
...sulfate (SDS),
...eins via non-
...e negatively
...the proteins by
...charge are
...me the
...olecules than the
...e gel. Molecular
...olecular weight
...GE:
...ility (distance
...s separated.

*Video: SDS-PAGE

Future Developments

- **To expand the platform to include more course topics**
- **To develop a generalized platform for life science students in CUHK**
- **To promote the system to other departments or faculties in CUHK**
- **To develop a generalized platform used by life science students in other local tertiary institutions**

Acknowledgement

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