

# Notes on Presentations

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## Does Emotional Intelligence affect one's academic and professional success?

- Emotional intelligence (EQ) represents an ability to validly reason something with emotions in order to enhance thoughts. Recognizing our own feelings for motivating ourselves.

### 4 branches of EQ

1. effectively regulating emotions
2. Understanding emotions
3. Assimilating Emotion in thought
4. Perceiving and Expressing Emotion

\*\*As we grow up and mature (up to age 49) our EQ increase but as we progress in age (50+) our EQ decline.

Purpose: to examine the relationship between emotional intelligence and people's overall success in life. ----Determine if there's a correlation between teenage EQ and academic performance. ----- Determine if there's a correlation between adults EQ level and professional success.

Procedure: Questionnaires are given to target group and scores are retaliated.

Results and conclusion: on-going research no definite results yet.

## Environmental Quality: Restoring the Bronx River

Bronx River - twisty stream (known as open sewer)

Water pollution - Unbalanced river, disrupt lake ecosystem

Goals - study quality of water

Compare newly obtained data with previous data

Draw valid conclusions

To clean the water - oysters will be added to water

Results - Since the year 2003 the water quality has improved. The river remains polluted.

## Analyzing Vitamin B

How? Analyzing the B vitamin in energy drinks and vitamin supplements

Vitamin B2 (Riboflavin), B6 (Pyridoxine), B12(Cobalamin), B3(Niacin).

Results - Riboflavin, Niacin, and Pyridoxine, were detected in energy drinks, but cobalamin was hardly detectable because of its low concentration in these drinks.

## TPH method 418.1

TPH is the measurable amount of petroleum-based hydrocarbons in an environmental base. This test is required by the EPA periodically each year.

Objective - to find the amount of petroleum based hydrocarbons in given soil samples.

This project illustrates that the method can be used to find out the percentage of hydrocarbons in a highly contaminated soil sample.

In the future - Freon and hexane are the (expensive) solvents used in this method. New solvents will be experimented in trying to find a more convenient solvent to use.

## Nanostructures capable of simultaneous emission and absorption in Near infrared for biochemical applications

\*\*Quantum Dots, QD, - are tiny crystals that glow when they are stimulated by ultraviolet light. The smaller the size of a QD, the shorter wavelength will be emitted by it.

Nanoshells (NS), are miniscule beads coated with gold. By manipulating the thickness of the layers making up the nanoshells, scientists can design these beads to absorb specific wavelengths of light. The most useful nanoshells are those that absorb near infrared light, which can easily penetrate several centimeter of human tissue. The absorption of light by the nanoshells creates an intense heat, lethal to cells.

QD and NS are important in bio-medical research and applications. ---useful in the treatment of tumors and cancer cells.

Hypothesis - Silver sulfide ( $Ag_2S$ ) have QD and NS properties. They would absorb and emit concurrently in near infrared.

Conclusion - there is an increase in absorbance at about 935nm, it is not enough to know whether it is a pea or just a noise. More experiments need to be done in order to find out how to prepare the particles to the assigned size.

### Circling Behavior and 2-deoxyglucose mapping in rats

Seizure - synchronized electrical discharges in the brain

Causes - Genetic factors, head injuries, strokes/cerebral vascular disorders, metabolic disturbances, toxic causes i.e. cocaine, heroine, and PCP, infections, tumors, degenerative disorders, brain damage during birth, fever.

Types - Partial/Focal (simple or complex), generalized Seizures (grand mal, petit mal)

Treatment- medicine (anti-convulsants), surgery (electrodes are placed underneath the scalp). \*\*anti-convulsants have side effects, drowsiness, nausea, dizziness, acute glaucoma.

Substantia Nigra is the part of the midbrain that is responsible for movements. It is involved in the expression of movements' disorders and seizures. It has 2 parts, Pars reticulata and pars compacta.

Procedure - Sprague Dawley rats at postnatal day 15 went through intracranial surgery to implant a cannula into the substantia nigra pars reticulata. Intranigral microinfusion of muscimol to produce rotational behavior. 2-deoxyglucose autoradiography to map the structure activated by the muscimol infusion.

Goal - establish the feature of the substantia nigra and how the sex hormones influence its development. Substantia nigra controls seizures. It is a part of seizure controlling network and it's different in males and females.

## Malaria, Mosquitoes and DNA

Malaria is an infectious disease that is transmitted by the bite of a female mosquito.

A mosquito is a small slim fly

DNA is the major part of chromosomes and carries genetic information.

\*\*Africa is where malaria is mostly widespread. Individuals who carry one copy of the change are less at risk to get malaria than people with two normal hemoglobin genes.\*\*

Procedure - extract the malaria gene from a female mosquito and place it into another female mosquito and see if the second mosquito can use the first mosquito's malaria gene and transmit malaria to another organism.

Expected Results - it is postulated that the second mosquito will be able to use the first mosquito's malaria gene and transmit the disease to another organism.

### Raman Spectroscopy

Spectroscopy is the study of how 'species' (atoms, molecules, solutions) react to light. Raman depends on a molecule's vibrations in reaction to light. In Raman spectroscopy, a spectrum can be produced by varying the frequency of the radiation, showing the intensity of the exiting radiation for each frequency. In this experiment the vibration, given off by light when it hits the sample, is being measured.

Anti-stokes spectrum is mirror spectrums of Stokes Raman Spectrums.

### Bio Physical Studies of Collagen: Developing a Model System for the Recombinant Collagen Type I Fragments

A collagen is a major structural protein that forms molecular cables to strengthen the tendons and tissues that support the skin and internal organs. - - - collagen

type I is the specific protein found in bones and is helpful in regenerating bones and healing wounds.

Objective - to create a model system of collagen type I fragments that will be expressed in E. coli bacteria, hence helping in understanding why collagen may mutate excessively in the body causing certain diseases i.e. osteoporosis.

Procedure - Grow collagen type I and using it to further study mutations and diseases that occur.

Results - inconclusive

## Effect of PKC Inhibitors and activators on Cell Aggregation of

### *Dictyostelium discoideum*

D. discoideum is a social amoeba that undergoes different developmental stages.

- Used in research, because it is similar to mammalian cells, to study signal transduction pathways.

Objective - using Pkc inhibitors and activators to prove that Pkc restrains PldB in

D. discoideum's CMF and cAMP signal transduction pathways.

Results - Pkc inhibitor added to Ax2 cells led to no aggregation

Conclusion - results are inconsistent and beta12 cells didn't aggregate at low cell density or aggregate earlier than the Ax2 cells as expected.



Future work - test to see if Pkc inhibits PldB when pldB over expressing cells aggregate.

## Immunology of celiac disease

Celiac disease - a digestive disease that damages the small intestine and interferes with absorption of nutrients from food

- Genetic disorder
- Symptoms - diarrhea, weight loss, malnutrition
- Gluten containing food damage small intestine in celiac disease patients
- Considered autoimmune disease (the body mistakenly attacks its own organs and tissues) i.e. diabetes type I, lupus, multiple sclerosis

Gut Lumen - villi are tiny, finger like structures that protrude from the wall of the intestine.

Microvilli are hair-like structures on the exterior of absorptive epithelial cells.

Epithelial cells are a layer of cells which contour the GI tract.

Objective - to find the cytokine levels in the serum of patients in healthy patients(control), active celiac disease patients, celiac disease patients on gluten-free diets, and refractory disease patients.

Conclusion - pro inflammatory cytokines appeared to augment in both active disease and celiac disease patients on gluten-free diets.

## Mouse Models of Prostate Cancer

Prostate cancer is a disease manifested by abnormal growth of tumor cells in the prostate gland. Prostate cancer can be detected by a digital rectal exam, a biopsy, or a PSA serum reading.

Problem: does PSA play a role in CaP?

Procedure: WT PSA gene is inserted into mice. Then, a mutant form of PSA gene is needed so that it could be compared with the mut mouse and see whether it will develop CaP in a different way than the WT PSA mouse.

Goal: mutate the PSA gene (in a plasmid) nucleotide sequence so that a serine amino acid is changed to an alanine in the PSA gene for injection into the mouse

## Oysters & the restoration of the Bronx River

Purpose: to examine the possibilities of recovery in the Bronx River and to preserve aquatic life in the Bronx River.

Why? Oysters have been seen in the River, however in small numbers. Adults

Oysters are able to filter about 5 gallons of water. They are filter feeders.

Oysters require 18C to 20 C water temperature. Phytoplanktons are their first source of food. Although oysters are filter feeders they require a low pollution level in their habitat in order to survive.

Expected results and conclusion: it is expected for the River to become more filtered than polluted. Oyster can help the River, and will also make it better. And hopefully the oysters can stimulate other aquatic life growth in the River.

## Statistical Analysis of gene expressions

Objective: to identify genes that have been differently expressed between recurrent and non-recurrent prostate cancer tumors and to use different of calculating gene expressions.

Prostate cancer is the abnormal growth of tumor cells in the tissues of the prostate gland.

Problem: what are the factors that influence cancer recurrences?

To go about solving the problem, scientists rely on the methods of biostatistics.

Procedure: Compare gene expressions in recurrent and non-recurrent patients, using Microsoft Excel and the R statistical Package.

## Epidemiology - Impaired Glucose Tolerance in HIV-Infected

### Drug Users

Epidemiology - the study of how disease is dispersed in through the body and the feature that determine the allotment

Purpose of epidemiology is to hint the reasons for the alterations that happen over a period of time

To go about this study epidemiologist need to identify the etiology - the set of features that contributes to the occurrence of a disease.

They have to determine the extent of the disease in the community.

They than have to study the history of the disease.

Aim: determine impact of HIV infection, PI therapy and HCV infection on the occurrence of IGT and type 2 diabetes

IGT: Impaired *Glucose* tolerance - subject has a high blood sugar level but not high enough to be called diabetes; considered pre-diabetes

Diabetes Mellitus: a relative or absolute insufficient amount of insulin leading to uncontrolled carbohydrate metabolism in adult onset diabetes there seems to be an association with obesity. Race, age and genetic history affect IGT

Conclusion: none, ongoing study

## **Mercury and Autism**

Mercury - metallic element, liquid at room temperature, used in thermometers.

Everyone is exposed to mercury; through vaccination, womb, contaminated seafood or accident.

Autism - is a pervasive developmental disorder, expressed in varying degrees of disability making it difficult for diagnosis.

In recent years, it has been postulated that there is a direct link between level of mercury exposure and chances of developing autism.

Problem: Why doesn't everyone develop ASD if all people are exposed to mercury?

Is cold vapor atomic absorption capable of quantitatively measuring level of mercury in head hair?

Results show that control participants were better able to release mercury through head hair. This supports the hypothesis.

In the future more variables will be obtained.

### Marine Sponges as a Model for Cellular Recognition (my project)

Marine Sponges are the oldest and simplest multi-cellular animals on earth, having originated over a billion years ago. Because of their simplicity, these creatures have become a useful tool for medical researchers attempting to unravel the mechanisms of cellular recognition.

Objective: This research was designed to identify a specific protein involved in cellular reformation of sponges, using the red sponge, *Microciona porifera*, and the yellow sponge, *Cliona celata*.

- We are also trying to control the sponge's ability to identify self.
- This can later be used to understand the immune system better. Hence helping us in organ transplants

Procedure: Experiment 1 - Cells were dissociated into Petri-dishes containing a salt water solution. The sizes of the aggregates were measured over time. Experiment 2 - Cells dissociated from each species were mixed and the sizes of aggregates were noted. Experiment 3 - An extract of *Cliona celata* was mixed with the dissociated cells of *Microciona porifera*. Preliminary results suggest that a factor isolated from *Cliona celata* is required for *Microciona porifera* to re-aggregate

Results: According to the results of the experiment, marine sponges can be used to study the functions of the immune system. Preliminary results suggest that the "cell-to-cell" recognition system of the marine sponge, *Microciona porifera*, is similar to antigen antibody recognition, in that cell-surface proteins are involved.

When whole sponge cells are mixed, aggregation occurred only between the Microciona cells, indicating its ability to recognize self