

ANTIBODIES & IMMUNOASSAYS: A SUCCESS STORY IN BIOTECHNOLOGY

Presented

At:

STAO November 11-13, 2004

By:

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ABSTRACT:

Through this inquiry based workshop participants will conduct a gel immunoprecipitation assay utilizing simulated antibodies and antigens. Participants will also have the opportunity to associate the importance of immunological assays with biotechnology, and incorporate such principles and misconceptions to their biology classes. In addition extension activities will be discussed, that resonate with the process of designing enriched experiments and optimizing additional laboratory protocols. Through this session participants will eventually appreciate and hopefully deliver the activities to illustrate the effective use and/or limitations of immunological assays in prenatal screening, disease testing, evolutionary trend analysis, and in forensics. Participants will receive a demonstration kit and instructions.

ABOUT THE PRESENTER:

Mr. Melegos is currently a science teacher at G.L. Roberts C.V.I., with the Durham District School Board. His teaching career started 5 years ago, by teaching high school science and math courses. Prior to teaching, Mr. Melegos was a medical research associate with The Toronto Western Hospital, Mount Sinai Hospital, and The Hospital For Sick Children. He conducted research in the field of tumorigenesis, cancer monitoring & diagnosis, fetal development, and neurobiology for over 4 years with collaborators from the US, Europe, and Japan. Mr. Melegos has authored and published 23 original research manuscripts in various scientific journals. His educational research interests include the promotion of high school biotechnology, and scientific literacy. He has also been supportive in the development and maintenance of G.L. Roberts' environmental school of studies, which currently offers two new ministry approved courses. He is a member of the advisory board of the Durham's College new biotechnology program. Mr. Melegos is an honorary member of the Canadian Space Program.

NOTE:

Concepts presented at this conference will be also published in the educational periodical *Crucible* in the year of 2004-2005. Please do not hesitate to e-mail for additional information.

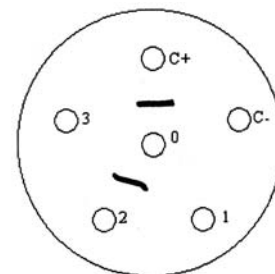
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Agar Gel Immunoprecipitation Assay (Simulation)

General assay configuration			
Well ID	Sample	Constitution	
0	Ab	0.5M BaCl ₂	
C+	+ve control	0.1M Al ₂ (SO ₄) ₃ •16H ₂ O	Yes
C-	-ve control	H ₂ O	No
1	Unknown 1	H ₂ O	No
2	Unknown 2	0.5M Na ₂ SO ₄	Yes
3	Unknown 3	H ₂ O	No

Anticipated Results



Instructions for educators

Non-nutrient Agar plate protocol (class set of 30-2.5% agar plates)

- Add 12.5g of non-nutrient agar to 0.5L of boiling water/you may microwave or autoclave
- Pour ~15mL of melted agar into 30 petri-dishes
- Let agar solidify @RT, prior to storing at fridge temperature

0.1M Al₂(SO₄)₃•16H₂O (30mL; 1mL/student)

- Add 1.89g of Aluminium sulphate to 30mL of water
- Mix thoroughly

0.5M Na₂SO₄ (30mL; 1mL/student)

- Add 2.13g of Sodium sulphate anhydrous to 30mL of water
- Mix thoroughly

0.5M BaCl₂ (30mL; 1mL/student)

- Add 3.12g of Barium chloride to 30mL of water
- Mix thoroughly

Agar plate well preparation (please use the template located at the back of this handout)

Summary of suggested scenarios

- Students may perform or design immunodiffusion assays for prenatal biochemical screening. Elevated levels of Alpha fetoprotein (AFP) in maternal serum or amniotic fluid correlate with fetal neural tube defects/spina bifida. In addition, they may develop a simulated pregnancy indicator test to detect HCG levels in plasma or urine.
- Students may perform or design immunodiffusion assays for the detection of BSE, SARS, West Nile virus, Avian Influenza virus, etc.
- In addition students could write a crime scenario, and create an immunodiffusion assay to be used in forensic investigation.
- Alternatively grade 12 students could use such an assay to perform gene/protein similarity studies of evolutionary related or distant organisms.
- Students may perform sensitivity/specificity studies, and further optimize the assay configuration (e.g. agar/chemical concentration vs immunoreactivity time and presence).

Selected Internet Resources

Using balloons to teach immunology

<http://www.aai.org/educating/using.htm>

The biology project: Immunology

<http://www.biology.arizona.edu/immunology/tutorials/antibody/structure.html>

Immunology Book Case

<http://microbiology.medicine.dal.ca/education/pimunit/home.htm>

What the heck is an antibody?

<http://people.ku.edu/%7Ejbrown/antibody.html>

How lymphocytes produce antibody

<http://www.cellsalive.com/antibody.htm>

Serodiagnosis

http://www.immy.com/training/SERO_01.htm

A collection of images of Ig structures

<http://www.path.cam.ac.uk/~mrc7/igs/mikeimages.html>

Introduction to techniques in immunology

<http://ntri.tamuk.edu/monoclonal/introduction.html>

Antibody assays

<http://jeeves.mmg.uci.edu/immunology/Assays/Assays.htm>

The Linus Pauling papers

<http://profiles.nlm.nih.gov/MM/>

Research

<http://antibodies.homestead.com/RESEARCH.html>

The antibody resource page

<http://www.antibodyresource.com/antibody.html>

Molecular immunology

<http://digilander.libero.it/danielefocosi/index2.html>

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