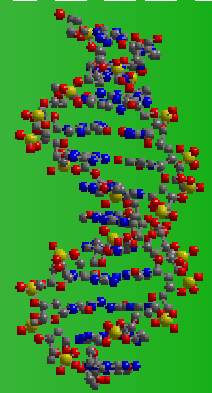


# Frontiers in Genetics: A Collaboration Between Michigan State University and the Michigan Department of Community Health to Educate Secondary Teachers

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One's mind, once stretched by a new idea, never regains its original dimension.  
-Oliver Wendall Holmes



## BACKGROUND

Genetics is an important part of the science curriculum in Michigan schools<sup>A</sup>. As advancements in science occur, the curriculum evolves to reflect current relevance and understanding. New discoveries in genomics will change the past focus on rare single gene disorders to common chronic diseases. Awareness of genetic patterns behind common chronic diseases and the effect that environment and behavior have on the expression of genes will be important for students to learn as a concept for life, health, and informed decisions.

"I modeled how to use the (Harvard) website so they could try it at home and show their parents or extended family and they all came back telling me all kinds of family discussions about changing their lifestyles and how being able to change the choices was very helpful"

-workshop participant

## INTRODUCTION

Genetic literacy implies the ability to understand, interpret, and apply genetic information to health and lifestyle decisions<sup>B</sup>. In 2001, a needs assessment was conducted in order to develop the Michigan Genetics Plan. A thirty-one item questionnaire was developed, primarily targeting biology, life management and health education teachers. Over 400 questionnaires were mailed to middle and high school teachers with 168 responses received.

About 75% of the teachers stated the need to learn more about the implications of the Human Genome Project.

A major venue for increasing the level of genetic literacy among the public is in the classroom. One of the goals of the Michigan Genetics Plan is to *increase genetic literacy*. An identified objective for achieving this goal is to *integrate human genetics into curricula throughout the educational system*.

## PROJECT GOALS

*Frontiers in Genetics* was created to increase genetic literacy among secondary teachers and to integrate current human genetics knowledge and technology into the curriculum. The expected learning objectives and opportunities for participants were to:

- Update background knowledge in genetics and genomics
- Incorporate new genomics concepts into the curricula
- Disseminate current educational resources on genomics
- Communicate with leading genetic researchers
- Connect the secondary science curriculum to current genomics research
- Discuss teaching strategies for existing genomics classroom activities

## METHODS

The *Frontiers in Science Weekend Workshop Series* is part of the Master of Science degree program offered by Michigan State University (MSU), Division of Science and Mathematics Education. Since the 1980's, the workshop series has provided opportunities for teachers with secondary science credentials to meet with leading scientific researchers. The weekend workshop series is presented over a five-hour period; it is scheduled for two hours on Friday evening, and three hours on Saturday morning, on the MSU main campus in East Lansing, MI. One semester hour of credit is earned by attending the three workshops; both academic credit and non-credit participation are available. Registration is under non-degree, lifelong education status.

The *Frontiers in Science* format was used to create *Frontiers in Genetics*. With support from the Michigan Department of Community Health (MDCH), three weekend workshops, each targeting a different area of genomics, were developed and presented in the autumn of 2004. The Michigan content standards and benchmarks aligned with the national standards and benchmarks (AAAS and NSES) were used to guide the development of the workshops<sup>A</sup>. The workshop sessions included:

Veterinary Medical Genetics- John Fyfe, PhD  
October 1-2, 2004

Cancer as a Genetic Disorder- Susan Conrad, PhD  
October 29-30, 2004

Advances in Biology Genomic and Proteomics Analysis- David Dewitt, PhD  
November 19-20, 2004

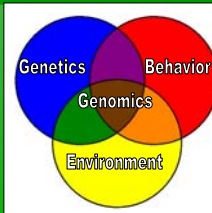
Modifications from the previous *Frontiers in Science* workshop format were:

- The research scientists and three master teachers worked together to create and present the workshops

- Three master teachers investigated existing genomics resources that would connect the classroom curriculum to the research
- The master teachers had used the genomic activities with their own secondary students
- The classroom activities, teaching strategies and additional available resources were discussed with the participants.

These existing resources are available via the web at:  
<http://michscioly.org/Genetic%20Frontiers/index2.htm>

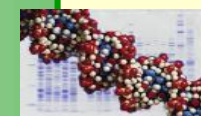
After attending two workshops, participants received the book entitled, *Is It in Your Genes?* by Philip R. Reilly. Participants are required to use a provided activity with their students by the end of the 2004/2005 school year. Feedback by the participants to the course organizer has been requested.



## RESULTS

- Frontiers in Genetics* demonstrates several achievements including:
- A collaboration between academia and public health
  - The incorporation of new genomics research and resources into existing continuing education courses for secondary teachers
  - Attendance by approximately 20 participants per workshop
  - Highlighting the importance of genomics
  - The requirement of continued genomics activities in participant's classrooms
  - The development of new genomics activities (Examples: mRNA, amino acids, protein synthesis project as well as an Alternative Splicing Activity)

Participants also stated that *Frontiers in Genetics* was especially helpful because of the method of linking the concepts to the classroom.



## DISCUSSION

Based on the success of *Frontiers in Genetics*, MDCH plans to continue to support such efforts in the education of teachers to increase genetic literacy within the state of Michigan. The Michigan Mathematics and Science Centers Network is an organization of independent centers committed to providing services to improve mathematics, science, and technology learning in Michigan schools. Futures steps include approaching the Michigan Mathematics and Science Network about conducting four to five more workshops across the state of Michigan in 2005. Continued support of web-based materials and existing resources will be provided by MDCH.

Possible future modification to *Frontiers in Genetics* include adding chronic disease health educators as presenters and encouraging secondary health teachers to participate.

"They (the students) were very clear about how they learned that environmental choices could be changed to better their life (and family's) not only now but in the future."

-workshop participant

Coming Soon  
Genetics to Genomics

## REFERENCES

<sup>A</sup>State of Michigan Education Benchmarks--Available online at: [www.michigan.gov/documents/MichiganCurriculumFramework\\_8172\\_7.pdf](http://www.michigan.gov/documents/MichiganCurriculumFramework_8172_7.pdf)

<sup>B</sup>Genetics Through the Life Cycle: Improving Health and Preventing Disease. A Needs Assessment and State Plan for Michigan. Online version available at: [www.michigan.gov/documents/MIgeneticsplanandassessment\\_\\_118168\\_7.pdf](http://www.michigan.gov/documents/MIgeneticsplanandassessment__118168_7.pdf)

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