

**LS-HHMI Outreach Summer Curriculum Project Classroom Resource Information Form**

<b>Title</b>	Human Brain Development  Resources: wikimedia commons, <a href="http://www.sfn.org/skins/main/pdf/brainfacts/2008/brain_development.pdf">http://www.sfn.org/skins/main/pdf/brainfacts/2008/brain_development.pdf</a> , <a href="http://www.learningdiscoveries.com.au/StagesofBrainDevelopment.htm">http://www.learningdiscoveries.com.au/StagesofBrainDevelopment.htm</a> , Anatomy Coloring Book (E. Wise and S. McCann, Kaplan Publishing, Chicago IL), Human Brain Coloring Workbook (K. Gupta, Princeton Review Publishing, New York, NY, <a href="http://isc.temple.edu/neuroanatomy/lab/embryo_new">http://isc.temple.edu/neuroanatomy/lab/embryo_new</a> , <a href="http://www.hhmi.org/biointeractive/neuroscience/animations.html">http://www.hhmi.org/biointeractive/neuroscience/animations.html</a> , <a href="http://www.teachnet.com/lesson/art/playdough061699.html">http://www.teachnet.com/lesson/art/playdough061699.html</a>		
<b>Resource Type</b>	Lesson Plan <input checked="" type="checkbox"/> Activity <input checked="" type="checkbox"/> Lab Activity <input type="checkbox"/> Homework Assignment <input checked="" type="checkbox"/> Correlations <input type="checkbox"/> Other <input type="checkbox"/> <Specify>		
<b>Description</b>	This resource provides lesson plans, a powerpoint and on-line resources to tie together neural tube formation, brain growth and wiring of the brain. The students will model the 3 stages, making sure to connect, compare and contrast the anatomical locations and cellular processes of each stage.		
<b>Author(s)</b>	Cheryl Wilson		
<b>Author Institution(s)</b>	Belmont High School		
<b>Objective</b>	Provide hands-on activities to allow students to understand the continuum of development in the nervous system, from induction through synapse strengthening		
<b>Key Concepts</b>	Big Idea-development and organ function requires the correct expression of genes at the right time and place. An individual's gene expression during nervous system cell induction, proliferation, migration, axon guidance, synapse formation, programmed cell death and synapse strengthening make our brains and nervous system what they are. Variations of this process help explain individual differences.		
<b>Student Prep</b>	High School Biology		
<b>Materials</b>	Paper (colored or white paper and crayons), stapler, tape, glue, toilet paper rolls, paper towel rolls, playdough or modeling clay (optional) and computer.		
<b>Grade Level(s)</b>	11 <sup>th</sup> or 12 <sup>th</sup>		
<b>Teacher Prep Time</b>	1.5 hours for reading, 1 hour for putting supplies together	<b>Class Time</b>	Around 2 hrs for Neurulation, 1 hr for Brain Growth and 2 hours for Wiring the Brain
<b>National Standards</b>	<To which National Science Education Standards does the resource correlate?>		
<b>State Standards</b>	Massachusetts Standards "Students in high school study life through cell biology and genetics (molecular level), vertebrate anatomy and physiology (tissue and organ levels)" Through this unit, they will work with molecular biology, cell biology, and vertebrate anatomy.		
<b>Sources</b>	<If the resource is derived or adapted from previously published material, cite the source(s) here.>		
<b>References</b>	<Cite any other sources that you referred to when developing the resource.>		

<b>Assessment</b>	I'll be walking around during the model making to see if the students are working well together, discussing and understanding the important features of the process. The students will present their models as a group to the class and I will see what their final understanding is. There will also be a test with multiple choice questions and open response at the end of the unit.
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