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Tuesday March 13, 2012

1. (2 points) The head and trunk organizer make antagonists against signaling molecules. They also undergo different morphogenetic movement. Can you write the type of antagonists present in the head and trunk organizer and the name of at least one gene? Also, indicate the morphogenetic movements associated with those structures (*).

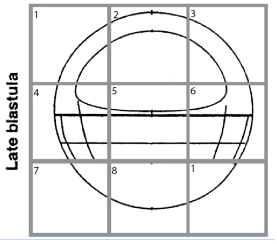
	Example of these antagonists (give one example of the gene name and the related pathway) [Antagonists for …. pathway, for example …]	Morphogenetic movement associated with this structure *
Head organizer	Antagonists for BMP pathway, for example noggin, chordin and follistatin Antagonists for Wnt pathway, for example dkk, fzb1	Spreading migration
Trunk organizer	Antagonists for BMP pathway, for example noggin, chordin and follistatin	Convergence and extension

*Options: Epiboly, invagination, ingression, enrolling, convergent and extension, spreading migration, lateral inhibition

2. (1 point) Noggin and Chordin are said to be (instructive | permissive) signals for neural formation? **permissive**

3. (5 points) Indicate with an X if the indicated molecule is present. For example, VegT is present in regions 8.

	Siamois	Nodals (xnr1,2,4,5,6)	b-catenin	BMP2,4,7	Goosecoid	Active SMAD2,3	Active SMAD1,5,8	VegT
4		X		X		X	X	
6	X	X	X		X	X		
8		X		X		X	X	X



Note:
Goosecoid and siamois are genes expressed in the organizer region.
Nodal receptors are expressed mostly everywhere. Nodal protein is secreted from quadrantes 7,8,9 and also produced by quadrants 4,5,6. Smads2,3 are activated wherever Nodal ligand is present.
BMPs are present everywhere except near the organizer, BMPs activate SMAD1,5,8.
VegT is a transcription factor that is only made in quadrants 6, 8 and 9.

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5. (4 points) Based on what you know about organizer induction, predict the outcome of the following experiments. Circle one answer from each column.

	Result A			Result B	
a) Inject non-degradable β-catenin on dorsal side	β-cat up	β-cat down	2° axis	wildtype	ventralized
b) Inject morpholino against Frizzled on ventral side	β-cat up	β-cat down	2° axis	wildtype	ventralized
c) Inject mRNA for GSK3 on dorsal side	β-cat up	β-cat down	2° axis	wildtype	ventralized

4. (Bonus 0.5 point) Explain how siamois is controlled by b-catenin and TCF/Lef:

TCF by itself is represses siamois; when beta-catenin is present, it couples with TCF and consequently depresses siamois.