

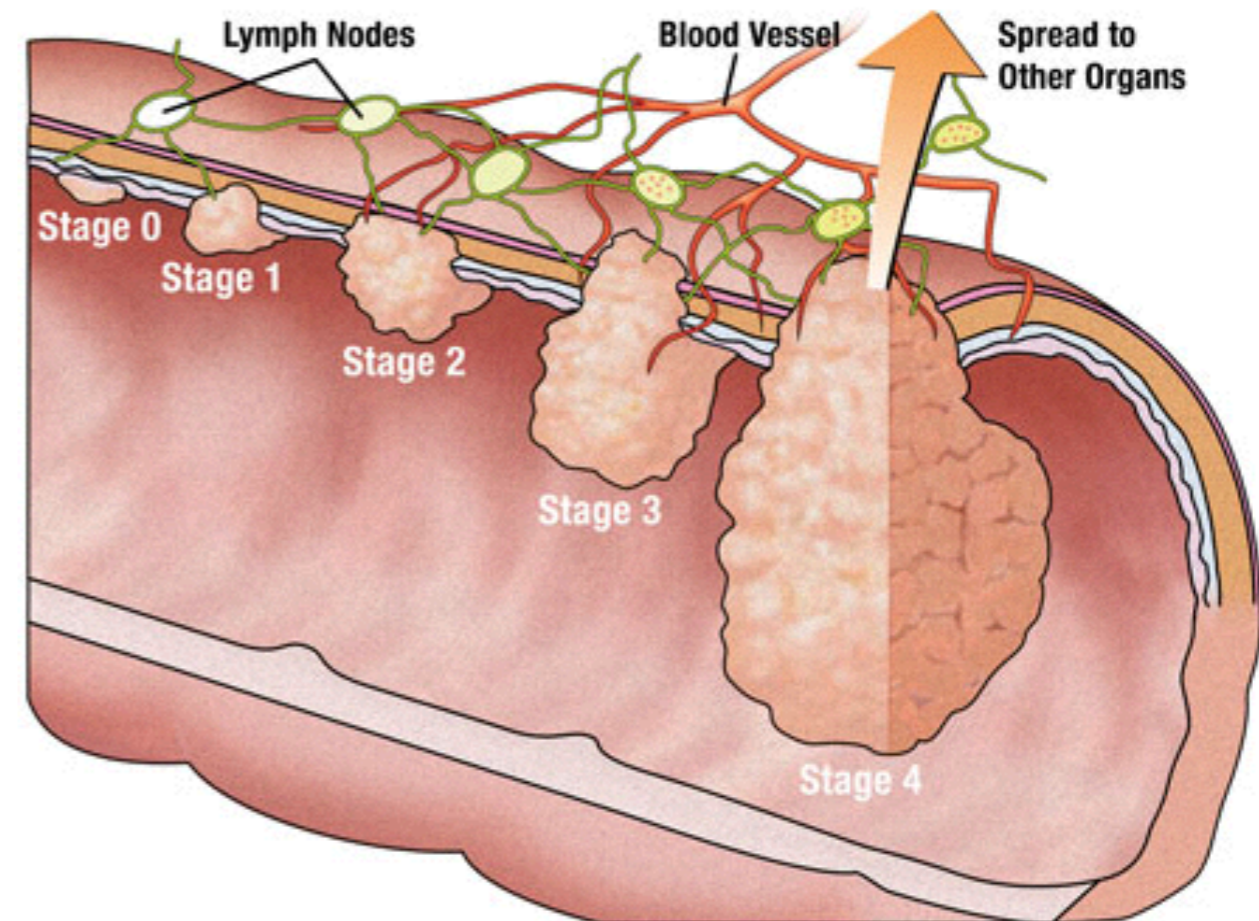
Role of 14-3-3sigma in Colorectal Cancer

Mikayla Simons

What is Colon Cancer?



Lifetime Risk: 1 in 20
Second leading cause
of cancer deaths



- **50,310 deaths expected in 2015**
- **136,830 new cases of Colon/Rectal Cancers**

What are the Warning Signs of Colorectal Cancer?



Blood in the Stool

Stomach Aches

Vomiting

Nausea

The importance of studying colorectal cancer

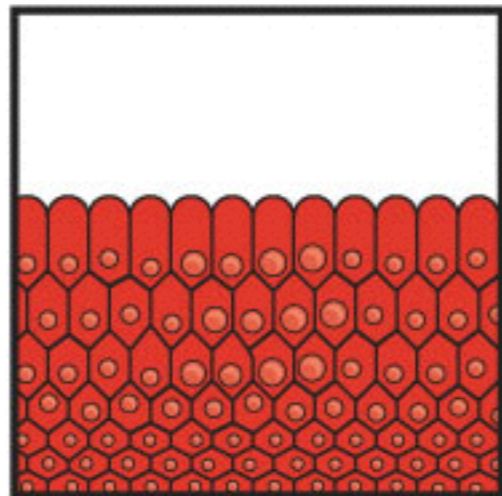
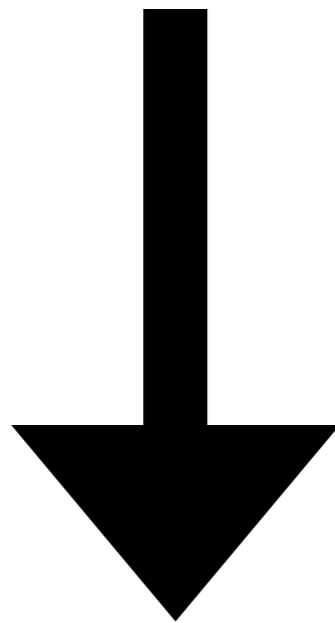


What is the genetic basis for colorectal cancer?

hyper-methylation
at the promoter



Stratifin (SFN), HME1

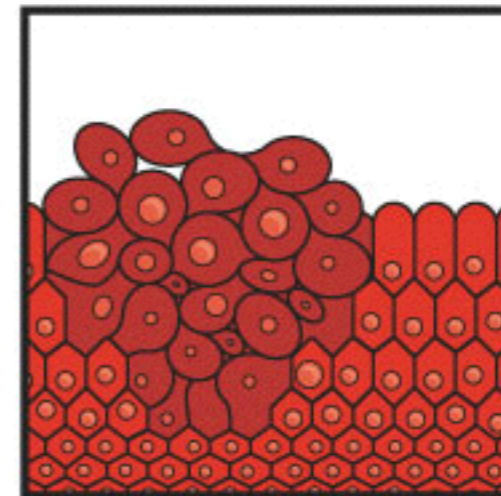


Normal cells

Occurs in
Keratinocytes

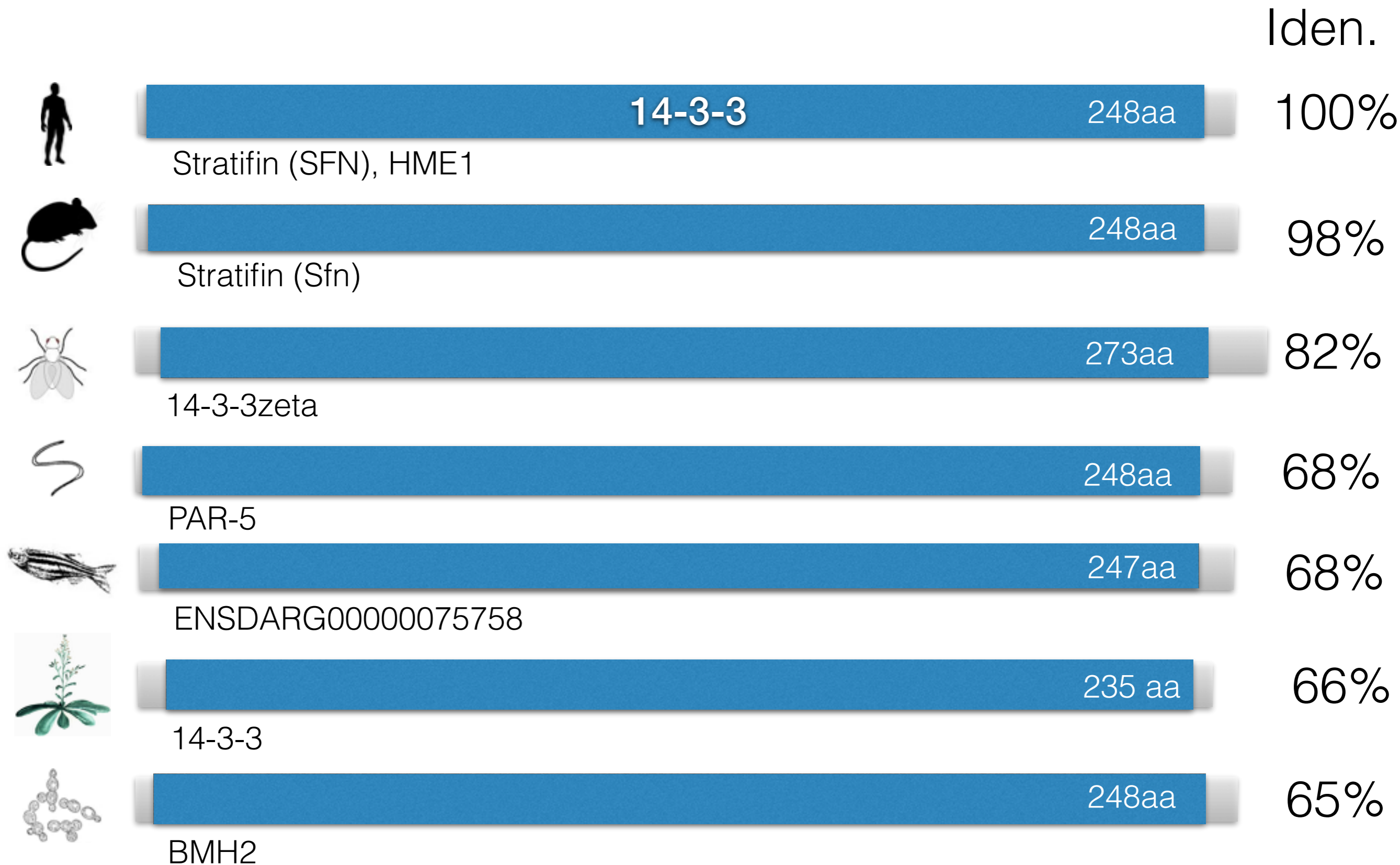


Causes:
UV Radiation
Cell Cycle Damage



Cells forming a tumour

14-3-3sigma is well conserved



What is PAR-5 and how does it function?

Worm

14-3-3

248 aa

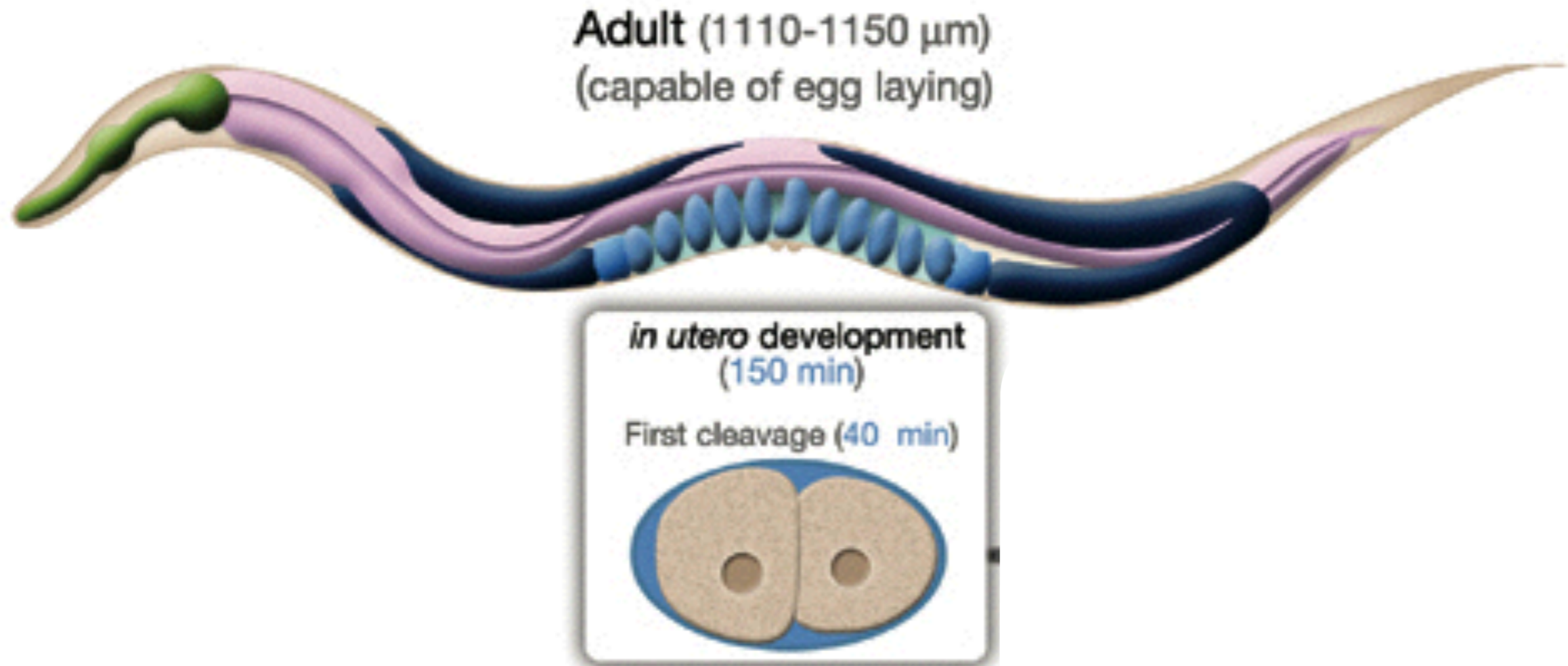
GO TERMS:

Partitioning defective protein

Zygotic asymmetric cell division

Essential for early embryonic development

Why *C. Elegans*?

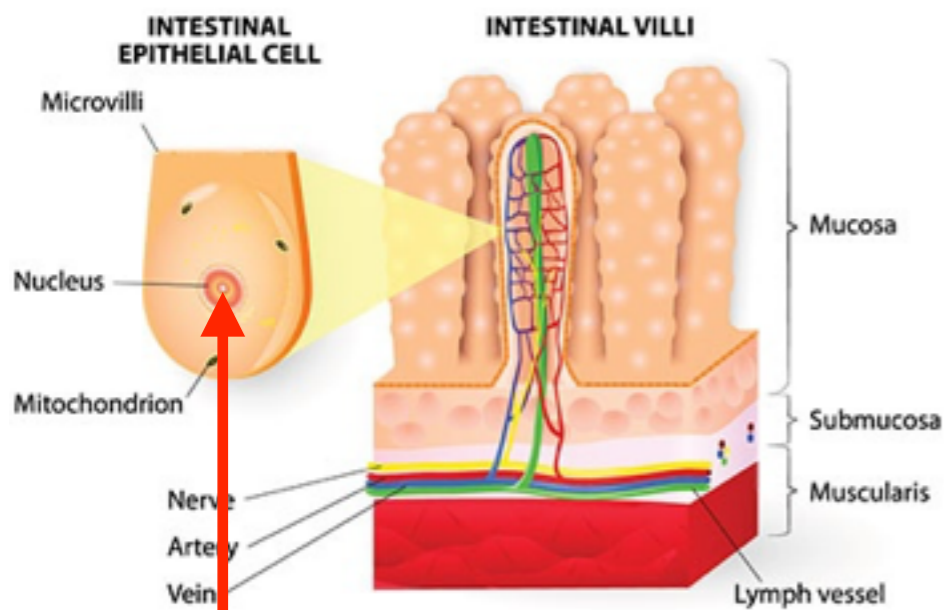


Prolific, Transparent, Easy to Image and Research

Where and how does 14-3-3sigma function?

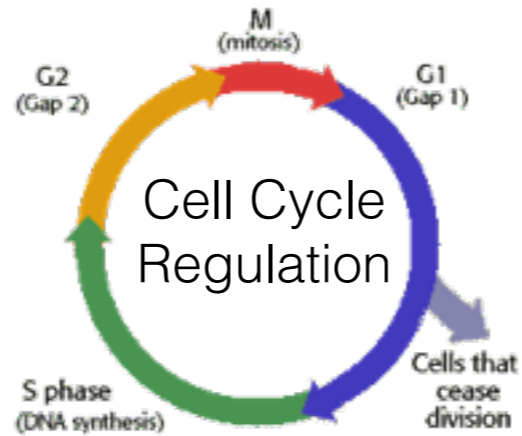
Cellular Components

Epithelial Cells

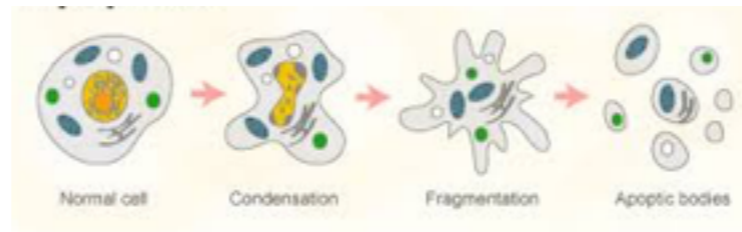


Nucleus

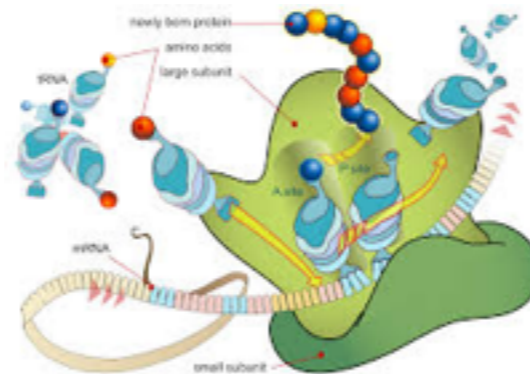
Biological Process



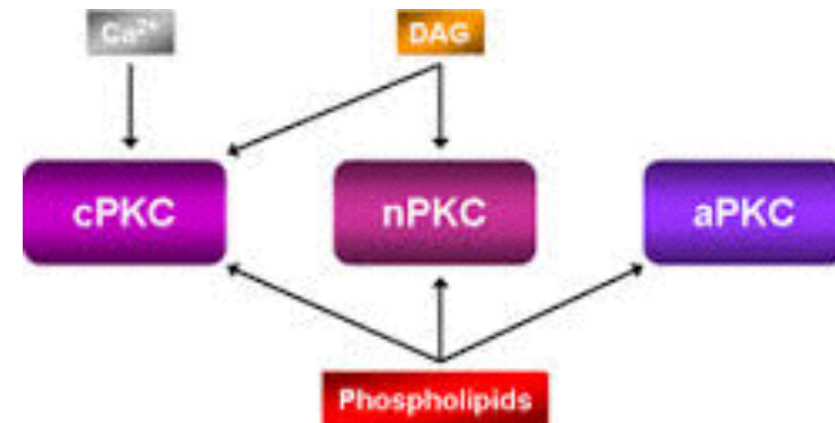
Apoptosis



Translation



Molecular Function



Protein Kinase C inhibitor activity

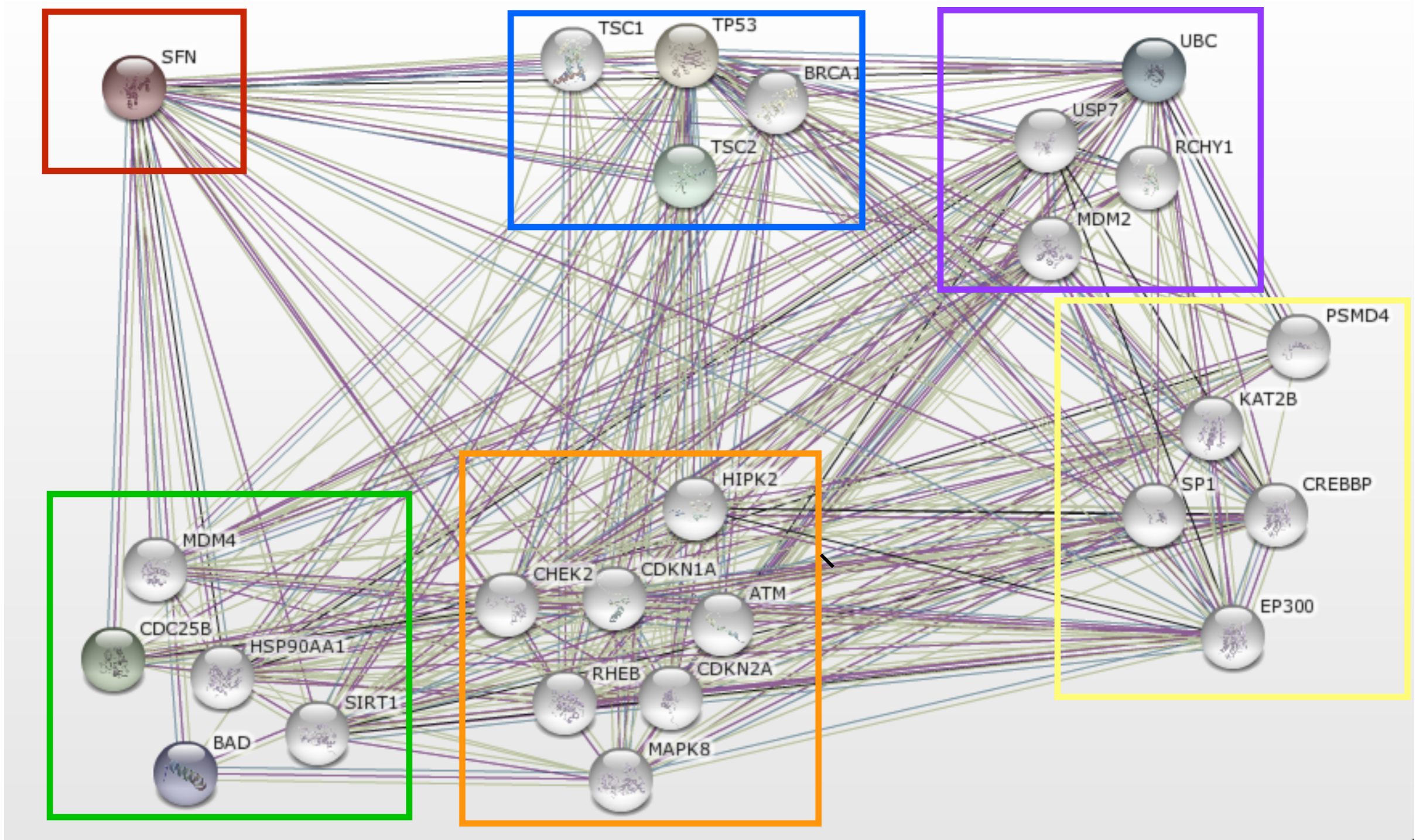
[http://en.wikipedia.org/wiki/Translation_\(biology\)](http://en.wikipedia.org/wiki/Translation_(biology))

http://www.biology.arizona.edu/cell_bio/tutorials/cell_cycle/cells2.html

<http://www.buzzle.com/articles/simple-columnar-epithelium-labeled-diagram-and-function.html>

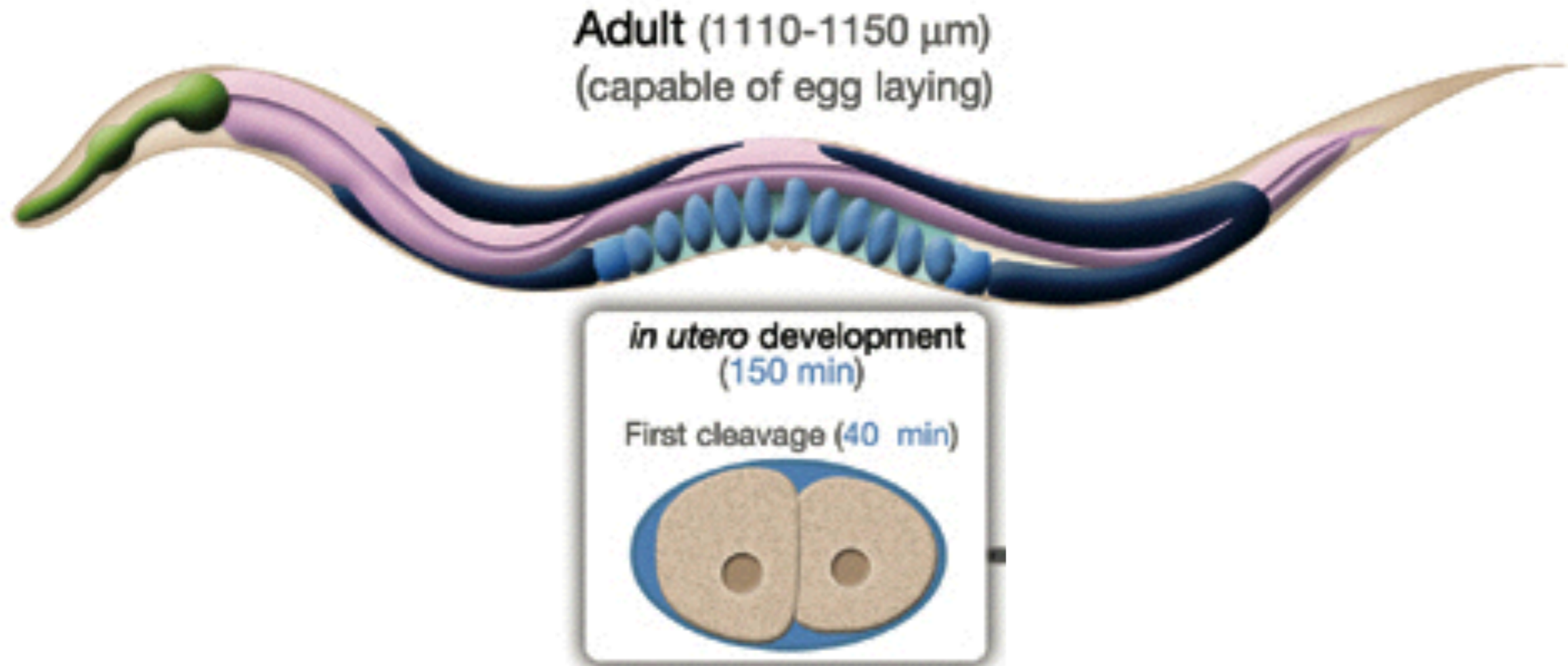
<http://www.abnova.com/support/resources.asp?switchfunctionid=%7BCBB86AB6-2EA6-422F-BBBD-1CB8B9DCE6FA%7D>

14-3-3 σ interacts with proteins necessary for serine/ threonine phosphorylation, cell cycle mediation, tumor suppression, ubiquination and Transcription factors



What is still unknown?

Though much is known about the role of 14-3-3 σ in translation, its role in **Cell Division** as it relates to colorectal cancer is unclear.



Video of *C. elegans* Division

Hypothesis: 14-3-3 σ /PAR-5 and its binding partners regulate the activity proteins necessary for cytokinesis by binding to serine/threonine sites.

Aim 1: To identify and sort the function of PAR-5 interacting partners and determine if they play a role in translation or cell division.

Approach:

STRING

SMART

GO
the Gene Ontology

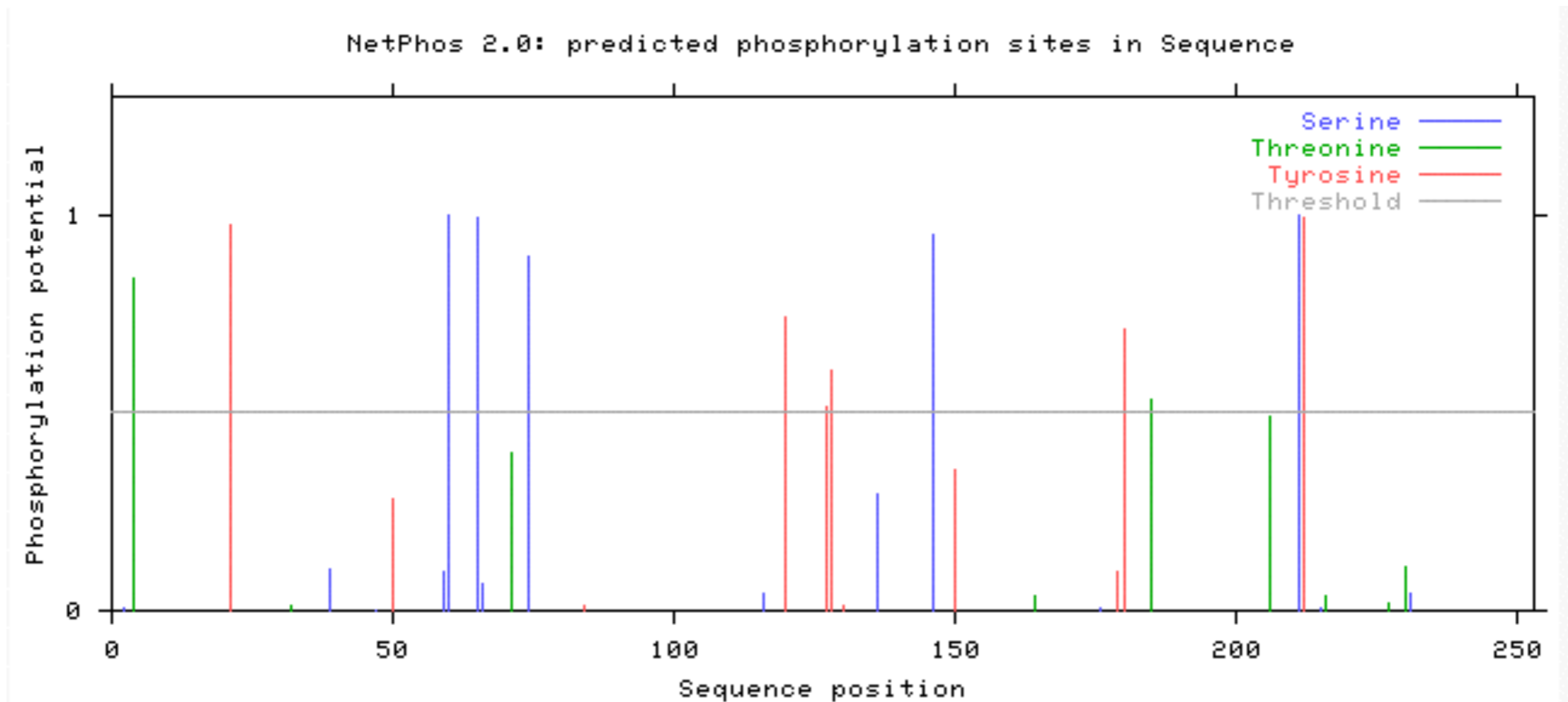
Rationale: By doing this, I will determine if PAR-5 interacting proteins function in cell division.

Actual Outcomes

The interaction networks.

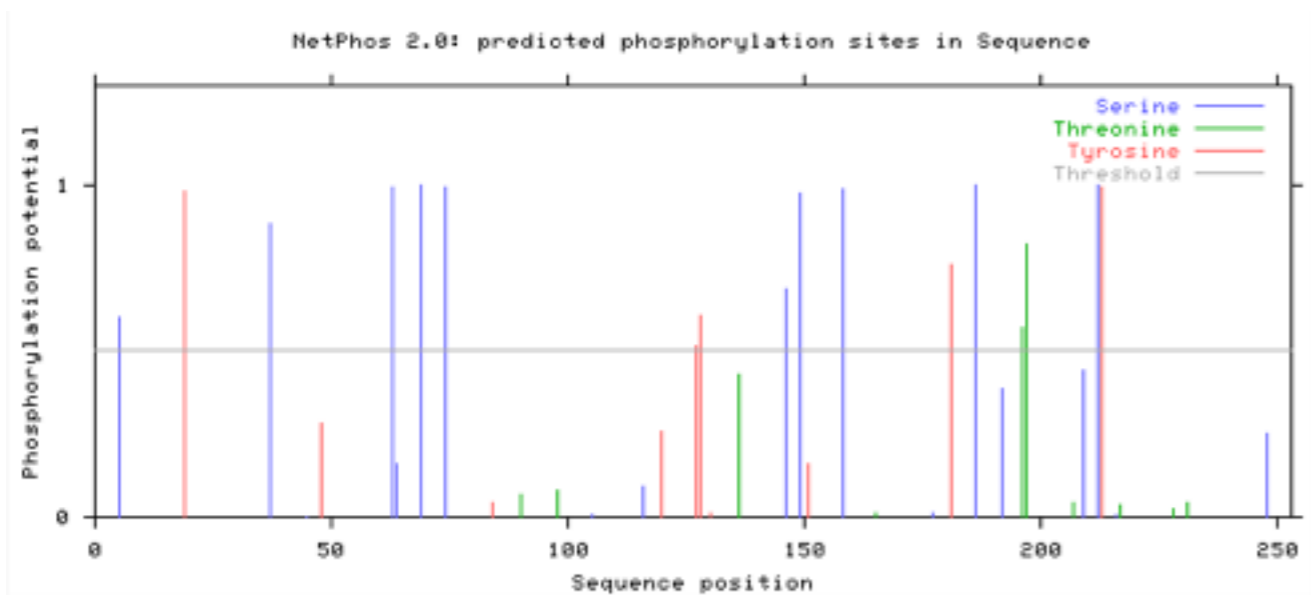
Aim 2: To identify conserved serine/threonine phosphorylation sites on PAR-5 binding partners that function during cell division.

NetPhos 2.0 for *C. Elegans*



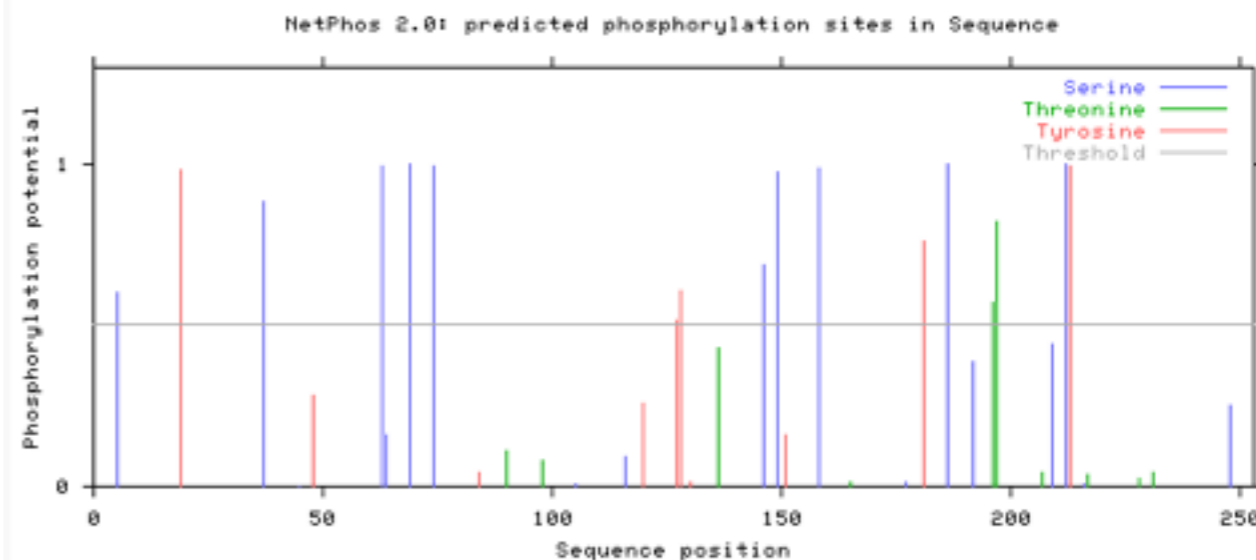
Rationale: I will be able to determine where the well-conserved phosphorylation sites are on proteins that function in cell division.

Most organisms have the exact same sites of PTM's.

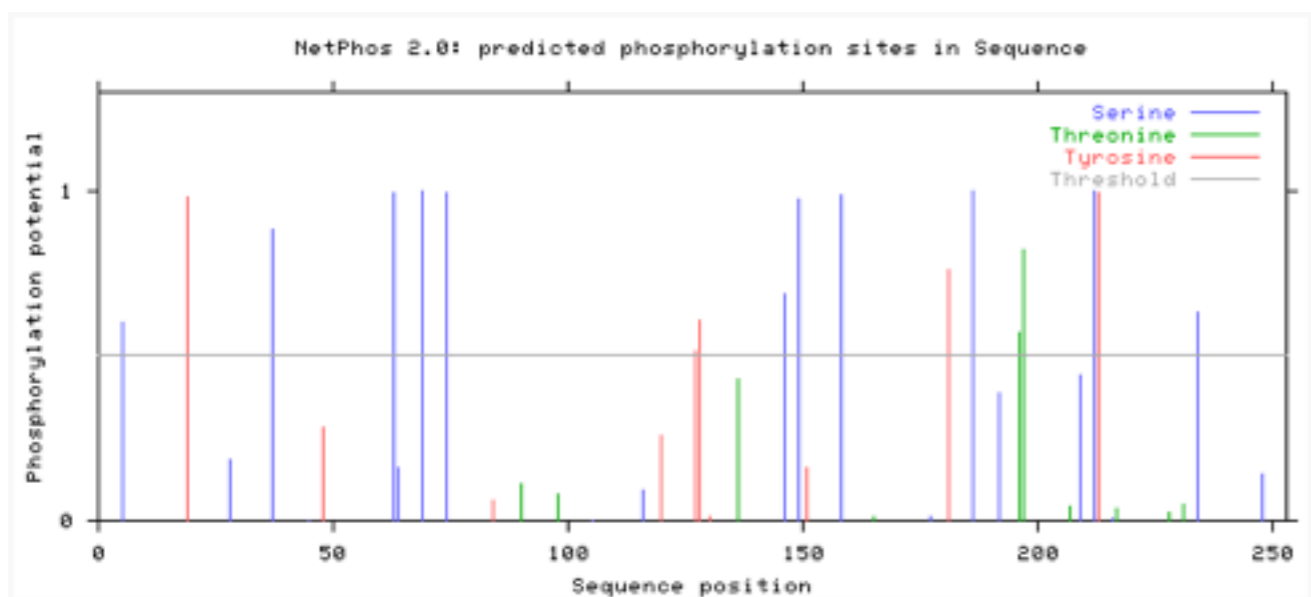


Human

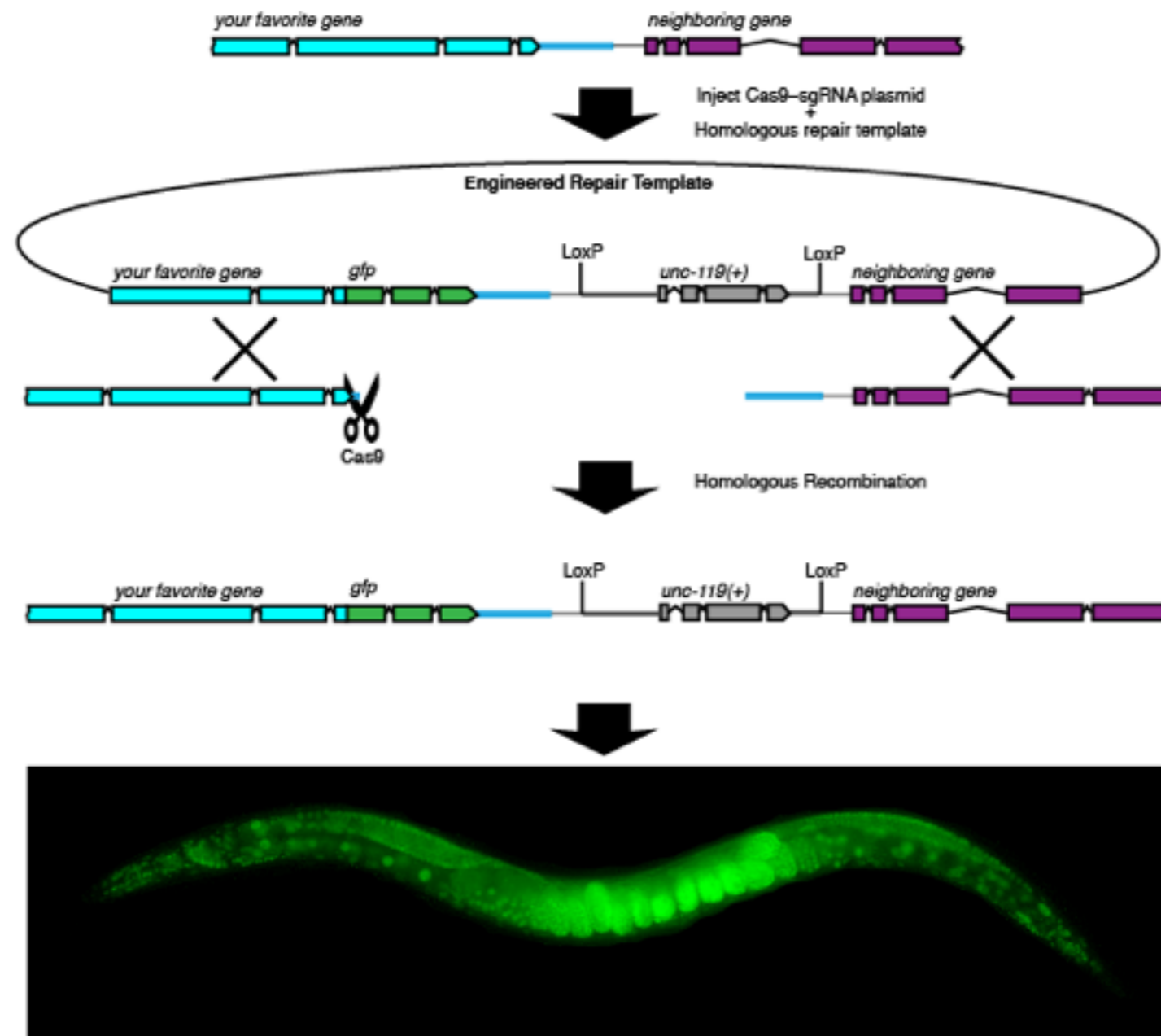
Mouse



Rhesus Monkey



Aim 3: Determine which PAR-5 interacting proteins functions in cell division.



Rationale: By performing this assay, I can identify phosphorylation sites on PAR-5 interacting proteins that are important for cytokinesis and then determine if these proteins localize to structures involved during cell division events.

Possible Outcomes

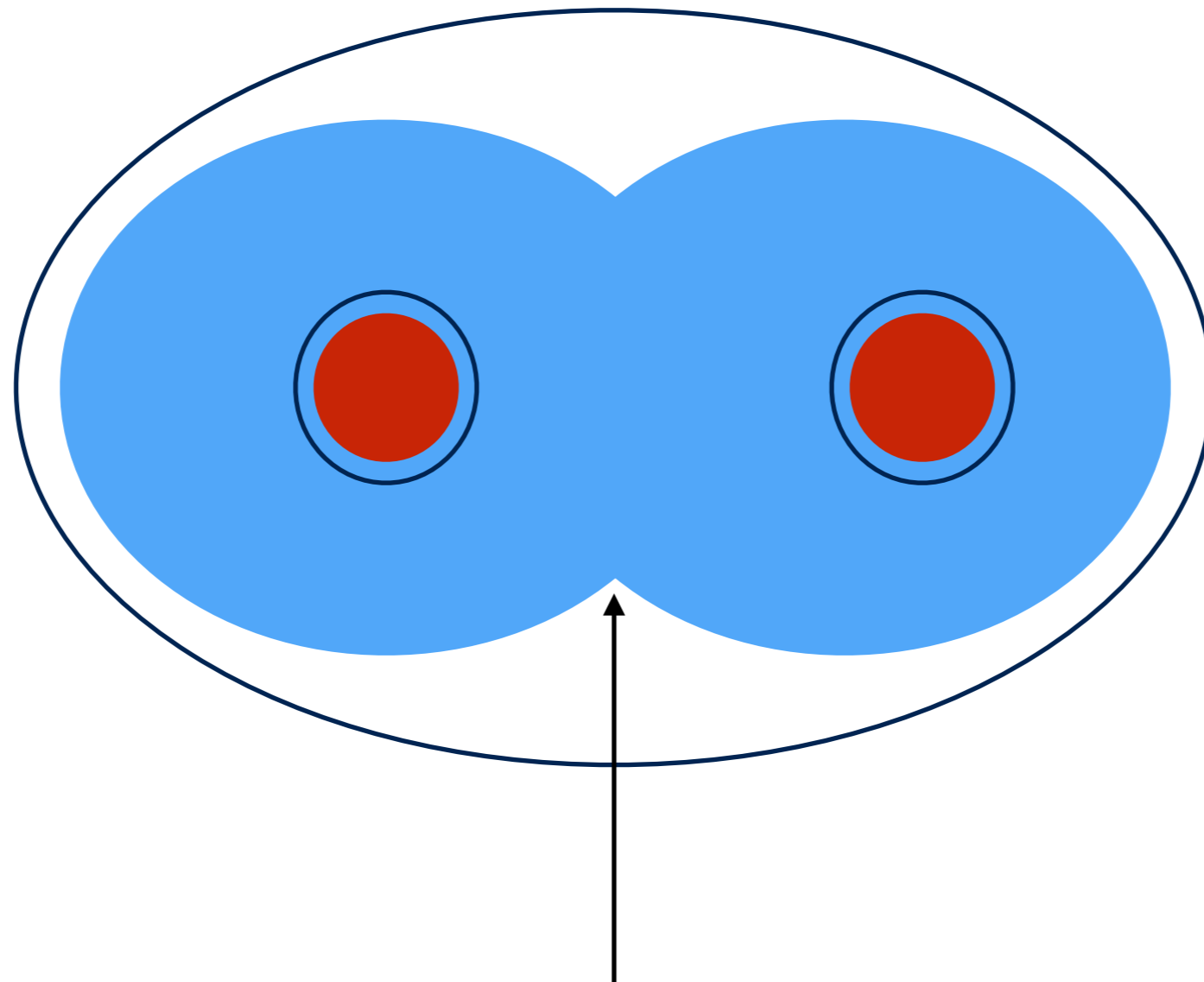


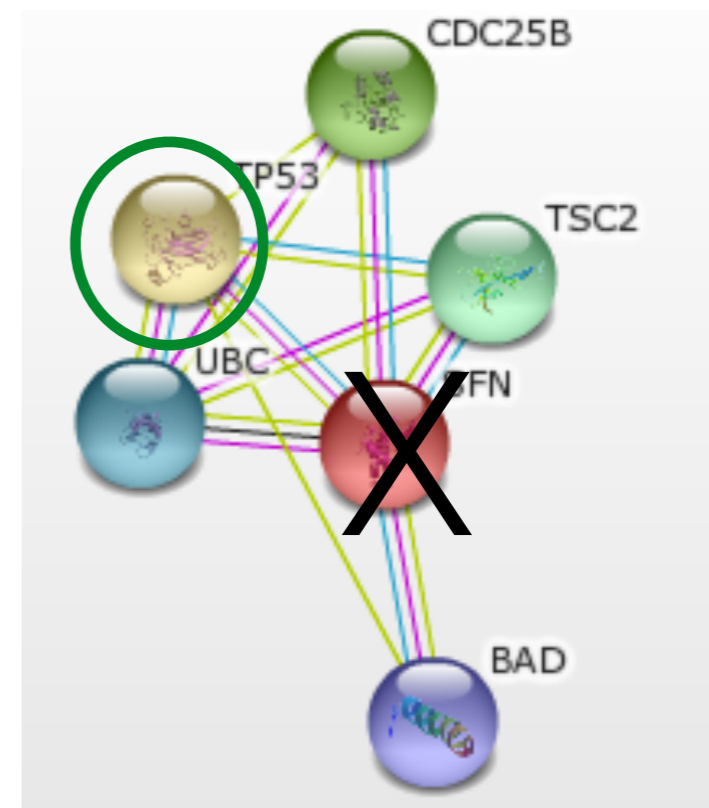
Figure out how to stop this from happening in cancer cells.

Future Directions

14-3-3sigma regulates cell division with the shared help of various binding partners and similar PTM'S

True

False



References

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