Opportunities and Challenges for Blended Learning @UM

RUIYU XIE
FHS

HSCI2000
Molecular & Cell Biology

1. OBSERVATION
2. HYPOTHESIS
3. EXPERIMENTAL DESIGN
4. EXPECTED RESULTS

PART 1 OBSERVATION

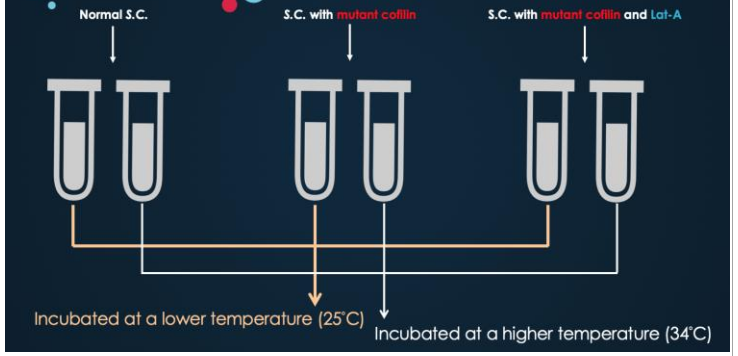
1. Cofilin is a small actin-binding protein. Cofilin is present in essentially all eukaryotic cells indicating that the protein performs a universally important function.
2. In vitro, cofilin acts by binding to actin monomers and actin filaments to stimulate depolymerization of actin. Little is known about the function of cofilin in vivo.
3. Actin filaments function in the cell by contributing to cell morphogenesis and motility, both motility of the cell and intracellular motility of cellular structures. The ability of actin to function in this capacity is coupled to the rapid assembly and disassembly of actin monomers.
4. Many mutations of cofilin are lethal but two temperature-sensitive alleles of cofilin in the yeast, Saccharomyces cerevisiae have been identified which are not lethal. The mutants, cof1-5 and cof1-22 result from the substitution of charged amino acid residues with an uncharged amino acid, alanine. These mutants grow normally at lower temperatures (20-25°C) but at higher temperatures (34°C), the cells become enlarged, contain multiple nuclei and larger than normal patches of actin.
5. The molecule latrunculin-A (Lat-A) prevents the assembly of actin filaments in cells but permits the disassembly of actin monomers from actin filaments. In yeast cells, Lat-A causes rapid disruption of the actin cytoskeleton caused by the disassembly of actin filaments with no assembly function.

PART 2 HYPOTHESIS

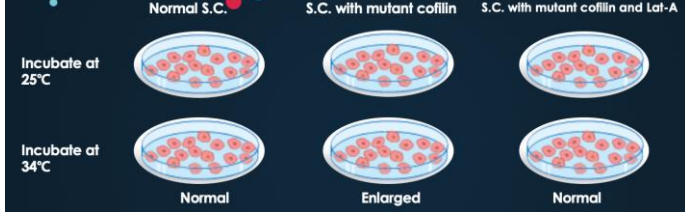
"*In vivo*, cofilin acts by binding to actin monomers and actin filaments to stimulate depolymerization of actin."

PART 3 EXPERIMENTAL DESIGN

We make the mutants, cof1-5 and cof1-22 by substitution of charged amino acid residues with an uncharged amino acid, alanine.



PART 4 EXPECTED RESULTS



	Sample 1	Sample 2	Sample 3
Cofilin	None	Wild-type	Temperature mutant
Lat-A	None	Presence	Presence
Actin	Presence	Presence	Presence

Next

Integrate “dry_classroom” and “wet_laboratory”
Virtual laboratory stimulation

Challenges

Self learning
Motivation