Systems Biology General notes

Darpan Ganatra

1 Background

1.1 Protein Kinase

A kinase (enzyme which catalyzes the transfer of phosephate groups from high-energy molecules to substrates) which modifies other proteins by adding phosephates to them (process of phosphorolation)

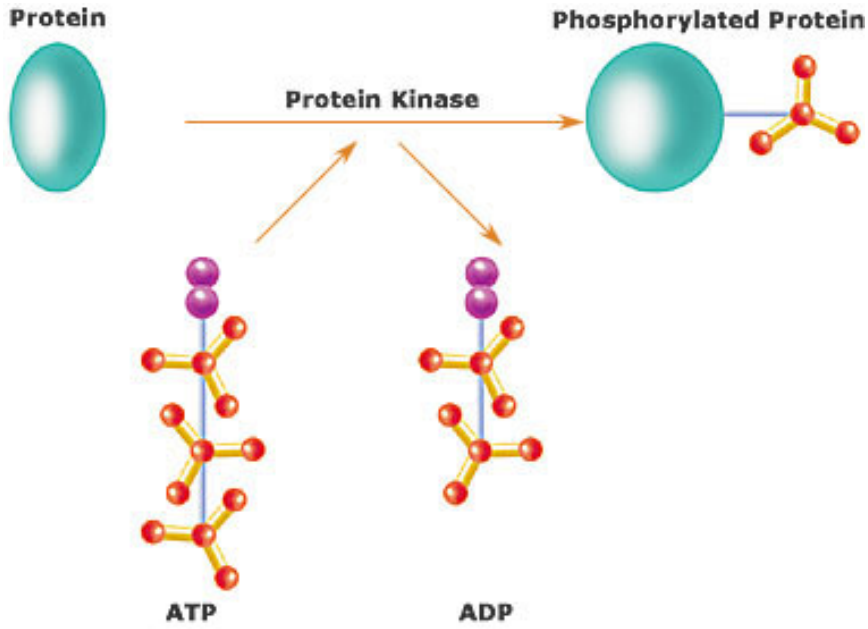

Figure 1: Protein kinase (Source: Wikipedia)

1.2 Mitogen-activated protein kinase (MAPK)

- MAPKs are protein kinases which are specific to serine and threonine amino acids. They're helpful in directing cellular responses to stimuli including but not limited to:
  - Migotens
  - Osmotic Stress
  - Heat shock
  - Proinflammatory cytokines
- These proteins are only present in eukaryotes
- Belong to the CMGC kinase groups
- 3 MAPK familes have been characterized:
  1. Classical MAPK (ERK)
  2. C-JunN-terminal kinase / stress-activated protein kinase (JNK/SAPK)
  3. p38 kinase
- MAP kinases lie within protein kinase cascades
- Each cascade has at least 3 enzlyes activated in series/sequence:
  1. MAPK kinase kinase (MAPKKK) - At least 14
  2. MAPK kinase (MAPKK) - At least 7
  3. MAP kinase (MAPK) - At least 12

2 MAPK/ERK Pathway <-> MAPK-inase Pathway

- MAP-Kinase (MAPK) signalling pathway and cancer mutation