Answer to Homework #12 (MMG409 2002)

1. These results indicate that PDGF receptors coupled to the PI-3 kinase pathway (Y40/51 curve) and PLC_ pathway (Y1021 curve) initiated near wild-type levels of DNA synthesis. Binding of GAP or Syp did not initiate DNA synthesis. These findings indicate the presence of redundant multiple signaling pathways in PDGF-induced mitogenesis.

2. a. If either kinase has a type I mutation, what response would you see when an extracellular signal is provided to the cells containing such a mutant?
   
   A: No response should be observed since the pathway would have a missing link.

b. If either kinase has a type II mutation, what response would you see when an extracellular signal is provided or is not provided.
   
   A: You would expect to see a positive response in the presence or absence of an extracellular signal. However, since an extracellular signal could diverged intracellularly into different pathways (like the RTK situation), responses may differ in the two settings.

c. You characterize a double mutant cell that contains K2 with type I mutation and K1 with type II mutation. You observe that the response is seen even when no extracellular signal is provided. In the normal signaling pathway, does K1 activate K2 or K2 activate K1?
   
   A: In the normal pathway, if K1 activates K2, we expect this combination of two mutants to show no response with or without extracellular signal. This is because no matter how active K1 is, it would be unable to activate a mutant K2 that is an activity deficient. If we reverse the order, K2 activating K1, the above observation is valid. Therefore, in the normal signaling pathway, K2 activates K1.