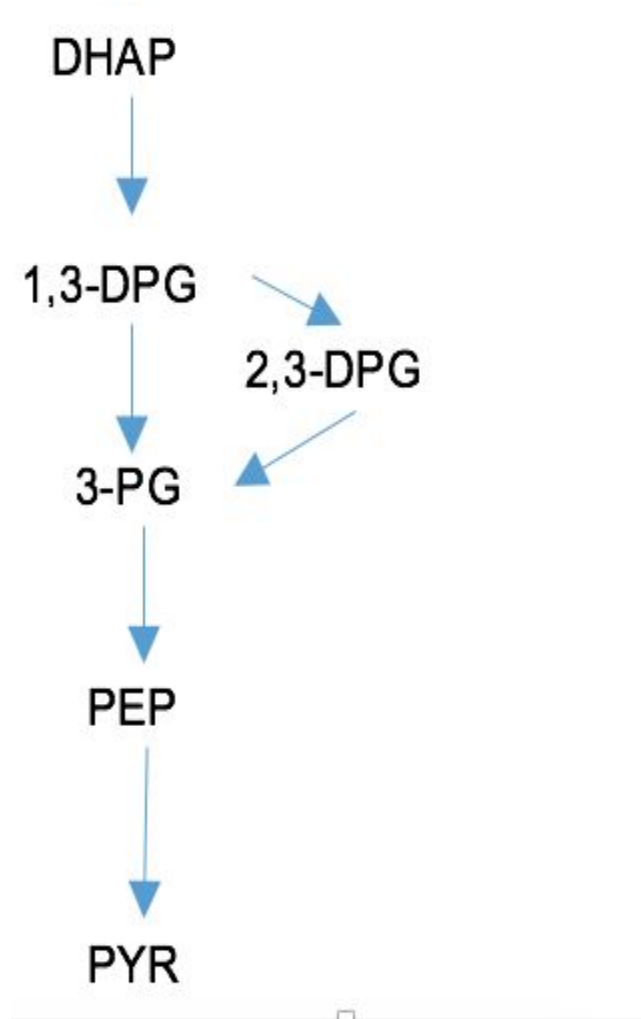


# Elucidata Data analyst Assignment 2

## Assignment based on Kinetic flux profiling research paper

This is a system similar to the X,Y system described in the paper. Consider the input labeled flux of the system to be  $F_0$ . [DHAP], [1,3-DPG], [2,3-DPG], [3-PG], [PEP] and [PYR] represent the concentrations of all the corresponding metabolites.



$[X]_T$  = Total concentration of X metabolite

$[X]_U$  = Unlabeled concentration of X metabolite

$[X]_L$  = Labeled concentration of X metabolite

Solve the following questions:

- What is the condition on fluxes for a system to be in steady state?
- If the above system is in steady state, write down the flux constraints at each node.

- Write down the ordinary differential equations wrt time for  $[\text{DHAP}]_T$ ,  $[\text{DHAP}]_L$  and  $[\text{DHAP}]_U$ . Explain the physical meaning of the equations.
- Write down the ordinary differential equation wrt time for  $[\text{PYR}]_L$ .

**(Bonus Questions) It would be good if you can do this!**

Consider two cultures. One has drug in it, the other has no drug. To find how the drug affects the system, you would want to calculate the fluxes of two systems.

- What kind of data can be expected from the above experiment which finally allows us to calculate the fluxes?
- Given the above data for all the metabolites, write down the steps required to calculate the unknown fluxes.