Session 20 - Pentose Phosphate Pathway (PPP)

Roles:

1.) Cell's primary source of NADPH ≡ biosynthetic reductive cofactor (Malic enzyme = another source)

2.) Source of ribose for ribonucleotides (also, this is entry portal for metabolism of ribose from diet)

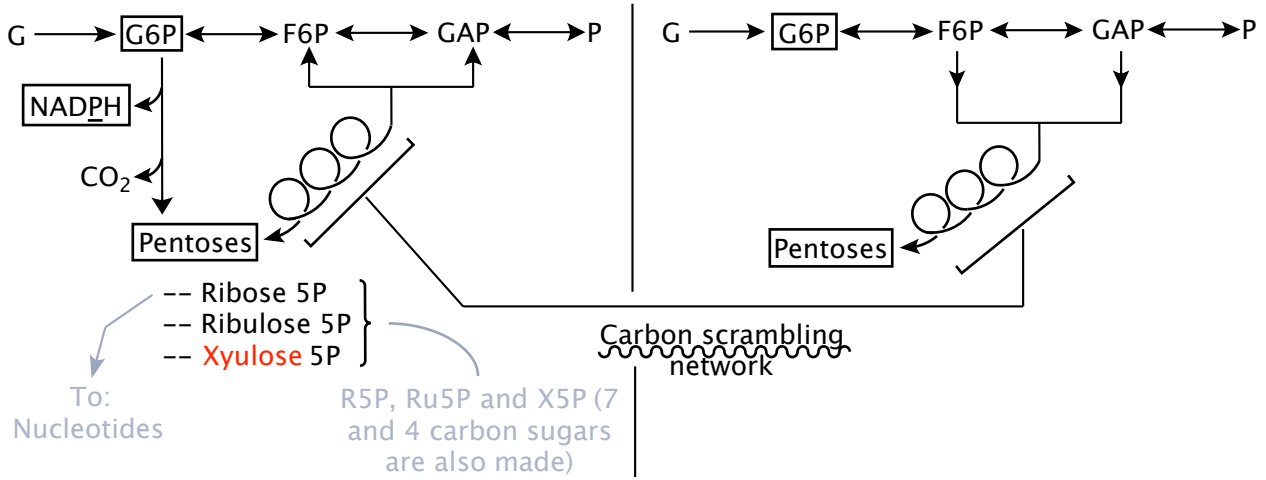
-- Highly expressed in tissues making lipid

-- Expressed in growing tissues (e.g. cancer)

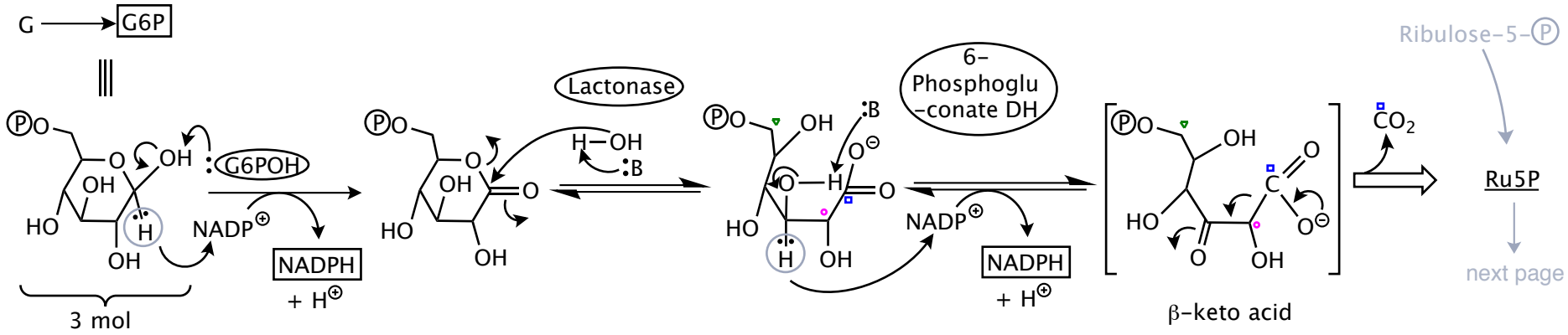
Pathway can run in either of two modes

A. Oxidative Mode: Need NADPH and Pentoses

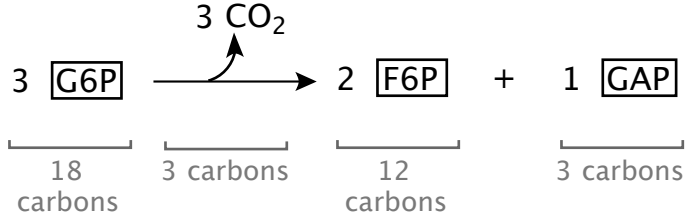
B. Non-oxidative Mode: Just need pentoses



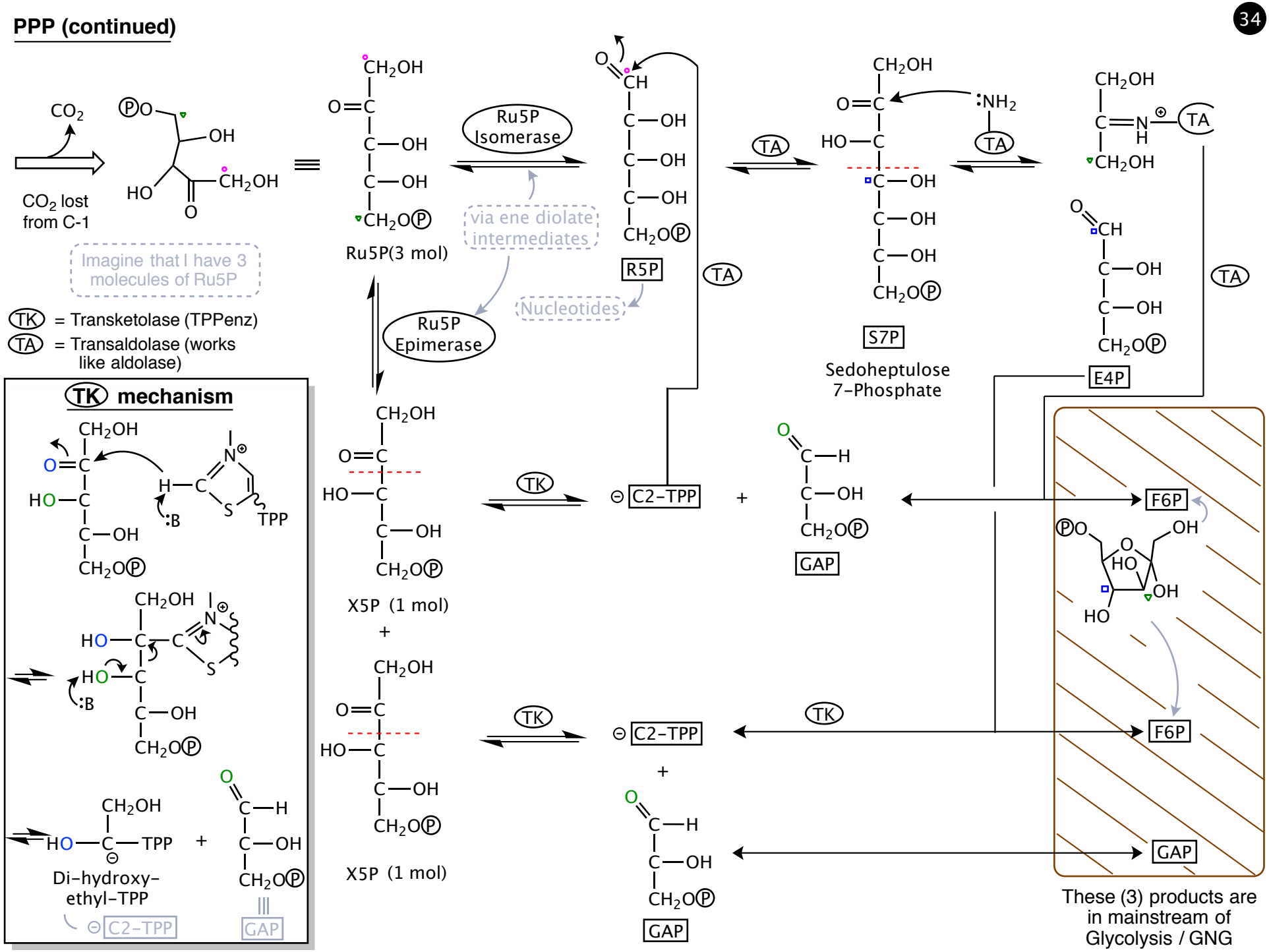
PPP Details (shorthand in 2 pages) -- This is cytosolic pathway



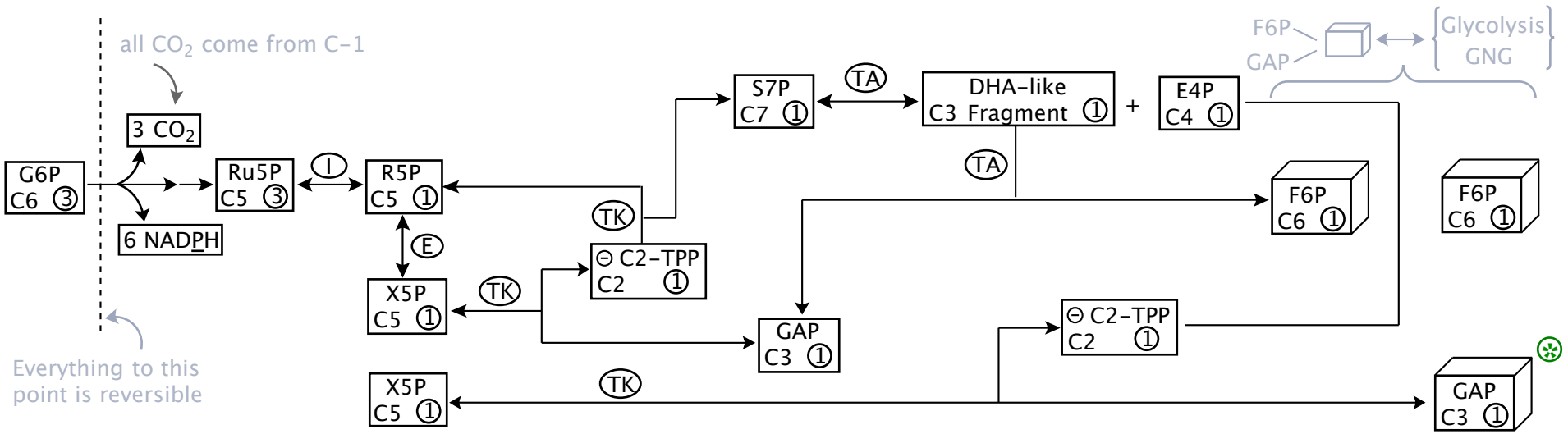
Typically the pathway is run by processing 3 mol of G6P



PPP (continued)



PPP Shorthand - Helps you see the mass balance



Summary Points on PPP

1.) Expressed in tissues when making lipid (and in growth)

2.) If run in oxidative mode, you could oxidize all carbons of glucose to CO_2 (if use GNG to get GAP and F6P back to G6P).

3.) PPP is entry point of dietary ribose into catabolism

4.) NADPH helps defend against oxidative stress (cofactor for glutathione reductase)

5.) Cytosolic pathway

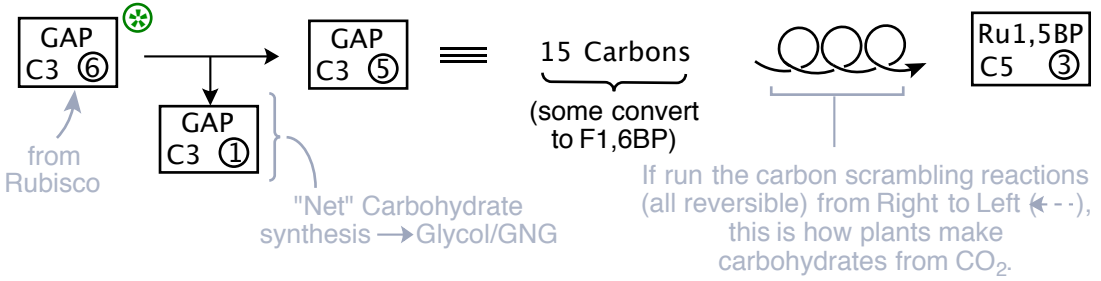
6.) G6PDH Rate determining step (Oxidative pathway) - stimulated by $NADP^{\oplus}$

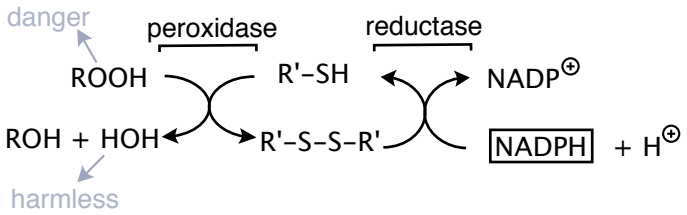
7.) Calvin Cycle = this series of reactions in reverse

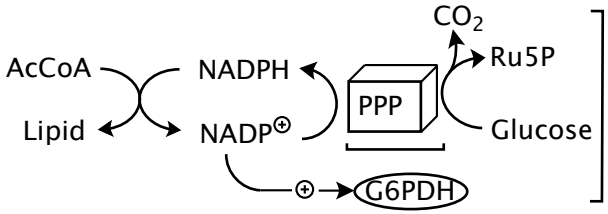
a.) Photosynthesis Ru1,5BP + CO_2 → → (2) PGA → → (2) GAP (Rubisco)

b.) Must regenerate catalytic molecule of Ru1,5BP (C5 sugar)

c.) Take 6 molecules GAP (18 carbons)







B

Cell regulates generation of NADPH via sensng need for FA biosynthesis (and other cytoplasmic NADPH regulated reactions)

= Glu Reductase
= RNR

5.07SC Biological Chemistry I
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