* Glycolysis – glucose to pyruvate
  + Fermentation
  + Regulation
  + 10 steps
  + 6 carbon atoms broke down into two 3-carbon molecules
* How do we recycle pyruvate
* Gluconeogenesis – make glucose – from pyruvate to glucose
* Glucose – monosaccharide – starch is the equivalent of glucose found in starch – we are able to digest starch but not cellulose
* Glycolysis – glucose to pyruvate and get ATP and NADH – need to go further even though it can stop there because NAD+ is depleted as it is converted to NADH
* Cells need to take pyruvate to generate NAD+ to generate another glycolysis
* We can convert pyruvate to lactate – homolactic fermentation – OR – alcoholic fermentation in yeast – pyruvate to acetaldehyde generating CO2 and then go to ethanol
* Third step is oxidisation of pyruvate – able to reduce oxygen to get more ATP – oxidation in mitochondria – need organism – can’t be done in anaerobic
* Lactosis or acidosis – when we do intensive exercise – take pyruvate plus NADH – using LDH – get L-Lactate and NAD+
  + Happens in animal cells – when there is too much pyruvate – can’t send them all to mitochondria – need to divert to other pathway
  + Eg. cancer – have higher metabolism – grow a lot – produce a lot of pyruvate
* Slide 6 – reaction highlighted in red – very low free Gibbs energy – these reactions are very favourable – going forward compared to others that are close to equilibrium
* Glycogen store can last for 1 day
* Gluconeogenesis – biosynthesis of glucose from non-carbohydrate precursors – lactate, pyruvate, and amino acids – happen in liver and kidney
* Glycolysis – catabolic pathway – degrade glucose to pyruvate
* Gluconeogenesis – anabolic – build up – pyruvate to glucose
* Reactions are not the same – high delta G – hard to go back – need different reactions – pyruvate kinase, phosphor…
* Reaction 10 – 2 enzymes when going up – pyruvate to oxaloacetate to phosphorene pyruvate
* 2 enzymes – pyruvate carboxylase – need ATP to reverse – vitamin B7 as cofactor
* PEPCK – use GTP
* Generate 1 glucose – needs 2 pyruvate
* Oxaloacetate needs to be converted to malate and then oxaloacetate – because both gly and glu are in cytosol – can cause futile cycle – we need compartmentation to control the metabolite
* Fructose-1,6-biphosphate to fructose-6-phosphate – remove 1 phosphate
* Need 6 ATPs to generate glucose from pyruvate – gluconeogenesis
* Cells invest energy by consuming ATP – cells need to produce glucose
* Cori cycle
* From glucose to glucow-6-phosphate – hexokinase and the reverse is glucose-6-phosphase – when G6P is too much – hexokinase is inhibited – activates G6Pase to make more glucose
* Control point 2 – reaction 3 – Glycolysis has ATP as inhibitor – when there is too much ATP, cells don’t need more – too much AMP and ADP need to produce more ATP
* Control point 3 – glucagon and insulin are hormone – insulin inhibits gluconeogenesis – insulin degrades glucose – glucagon is the opposite
* Glycolysis can use fructose, galactose, and mannose – different ATP use
* Stored sugar
  + Cells have storage of glycogen – go to glucose through glycolysis – degrade long polymer into saccharide or polysaccharide – reaction to generate glucose-1-phosphate
* 1-4 alpha linkage in glycogen
* Glycogen is how we store glucose
* Glycogen is not linear – if 1-4 alpha linkage – branching is 1-6
* Branching can pack better and store more glucose