Sing a Song of Science

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Mom, Music, Memory

- Earliest Learning Experiences
- Melodies Soothe - Brahms' Lullaby
- Melodies Teach - Alphabet Song

From Language to Melodies

- The Limerick
  - Fixed cadence
  - Set rhyme scheme - A-A-B-B-A
  - Words have rhythm and flow

I confess that I truly can’t see (9)
Solving problems mathematically (9)
So don’t ask me then (5)
How to double 2n (6)
Cuz it all seems so 4n to me (9)

A chemist was studying, see (8)
A fire hydrant's odd chemist-ry (8)
Inside it you know (5)
There was H-2-O (5)
On the outside she found K-9-P (9)

Challenges

Technical Accuracy
Rhymes
Matching Cadence
Depth

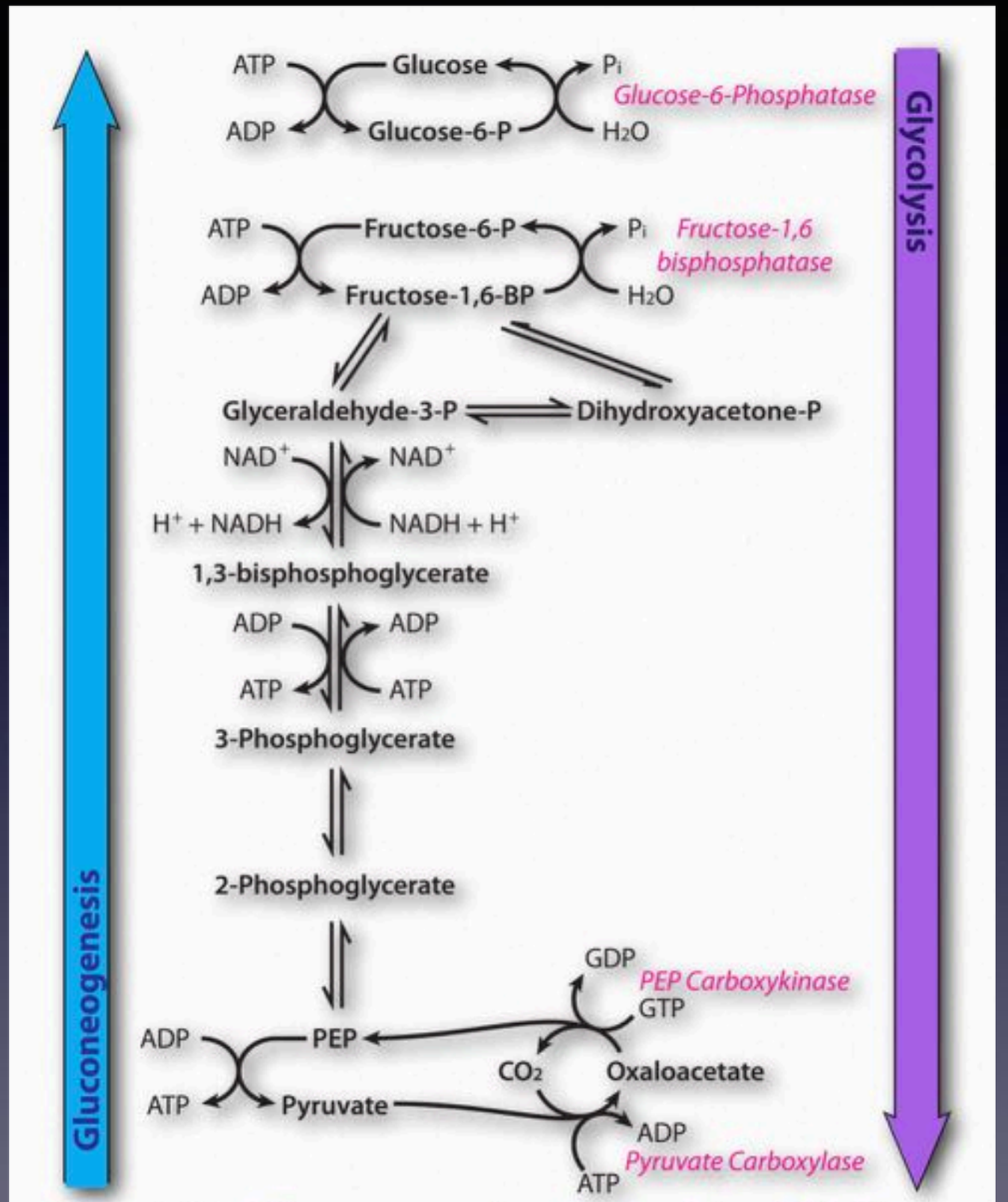

Figure 6.26 - **Gluconeogenesis and glycolysis. Only the enzymes differing in gluconeogenesis are shown**

Image by Aleia Kim

Start With Simple Tunes

- Battle Hymn of the Republic
- Let It Be
- America the Beautiful

The Ribosome

(To the tune of "*America the Beautiful*")

Tim Karplus' recording HERE

O beautiful with R-N-A
That makes the peptide bonds
You hold t-RNA so it
Can pair up with co-dons

The Ribosome! The Ribosome!
Translate mRNA
Initiate and translocate
From start to UGA

Rules

- Word rhythms must match verse/song rhythms
- Count syllables and match carefully
- Don’t get stuck on words/phrases that break the rhythm
- Start with easy rhyme schemes

Matching Cadences

- Supercalifragilisticexpialidocious (14)
- Glucose molecules are made by using two pyruvates (14)
- Gluconeogenesis is so exasperating (14)
- Superoxide dismutase is super catalytic (14)

Gluconeogenesis

to the tune of "*Supercalifragilisticexpialidocious*"

When cells have lots of ATP and NADH too
They strive to store this energy as sugar yes they do
Inside of mitochondria they start with pyruvate
(slow) Carboxylating it to make oxaloacetate

Oh gluconeogenesis is so exhilarating
Memorizing it can really be exasperating
Liver cells require it so there's no need for debating
Gluconeogenesis is so exhilarating

Oh, glucose, glucose come to be
Glucose, glucose come to be

Oxaloacetate has got to turn to PEP
Employing energy that comes from breaking GTP
From there it goes to make a couple phosphoglycerates
(slow) Exploiting ee-nolase and mutase' catalytic traits

Oh gluconeogenesis is liver's specialty
Producing sugar for the body most admirably
Six ATPs per glucose is the needed energy*
Gluconeogenesis is liver's specialty

Oh glucose, glucose joy to me
Glucose, glucose joy to me

“Cheater” Melodies Are Hard

- John Songs (Cheat) vs Paul Songs (Rules)
  - Paul uses one syllable per note
    - “Let It Be”
  - John stretches syllables across multiple notes
    - “I wanna hold your ha-a-a-a-a-a-nd”

A Paul Song

The Codon Song

(To the tune of *"When I'm Sixty Four"*)

Tim Karplus' recording HERE

Building of proteins, you oughta know
Needs amino A's
Peptide bond catalysis in ribosomes
Triplet bases, three letter codes
Mixing and matching nucleotides
Who is keeping score?
Here is the low down
If you count codons
You'll get sixty four

Got - to - line - up - right
16-S R-N-A and
Shine Dalgarno site

You can make peptides, every size
With the proper code
Start codons positioned
In the P site place
Initiator t-RNAs
UGA stops and AUGs go
Who could ask for more?
You know the low down
Count up the codons
There are sixty four

A John Song

Summary

- Language is melodic
- Melodies reinforce lyrics when matched
- Syllables matter
- Start simple - Start with Paul songs
- Metabolic Melodies - over 100 free downloads at www.davincipress.com

The Amino Alphabet Song

(to the tune of "*The Alphabet Song*")

David Simmons' recording HERE

Lysine, arginine and his
Basic ones you should not miss
Ala, leu, val, ile, and met
Fill the aliphatic set
Proline bends and cys has 's'
Glycine's 'R' is the smallest
Then there's trp and tyr and phe
Structured aromatically

Asp and glu's side chains of R
Say to protons "au revoir"
Glutamine, asparagine
Bear carboxamide amines
Threonine and tiny ser
Have hydroxyl groups to share
These twen-TY amino A's
Can combine a zillion ways