

Cultivating a New Normal: A Guide for New Families with FAODS

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"I'm pretty sure that you have something that
is difficult to pronounce."

In The Beginning..... Understanding the Basics of FAOD

- Question parents of newborns frequently ask:

In The Beginning.....

Understanding the Basics of FAOD

- **How does DNA analysis predict severity? (and when does it fail?)**
- Example - CPT II
 - ‘Neonatal crash’ - severe neonatal presentation of liver disease, hypoglycemia, hyperammonemia, sometimes with cystic changes in kidneys or other organs that “ran out of energy” prenatally
 - Infant/toddler hypoketotic hypoglycemia - degree of fasting intolerance can vary from one patient to another
 - Childhood or teen onset rhabdomyolysis
 - Adult onset muscle disease

In The Beginning.....

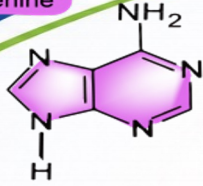
Understanding the Basics of FAOD

- How does DNA analysis predict severity? (and when does it fail?)
- **What is a “variant of uncertain significance”?**
- **What does it mean if only one DNA variant is detected?**
- **Why do some clinics recommend different things from other clinics?**

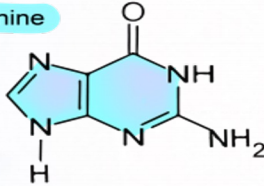
Genetics 101

- DNA is the blueprint to make all the substances your body needs to work
- DNA is located in the nucleus of the cell. It is shaped like a double helix
- Random changes can occur in DNA from generation to generation
- We have 2 copies of each strand of DNA, one inherited from mom and one from dad
- For most metabolic diseases, one working copy of a gene is enough, but if both copies have a mutation the gene may not work properly

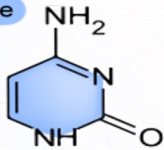
Adenine



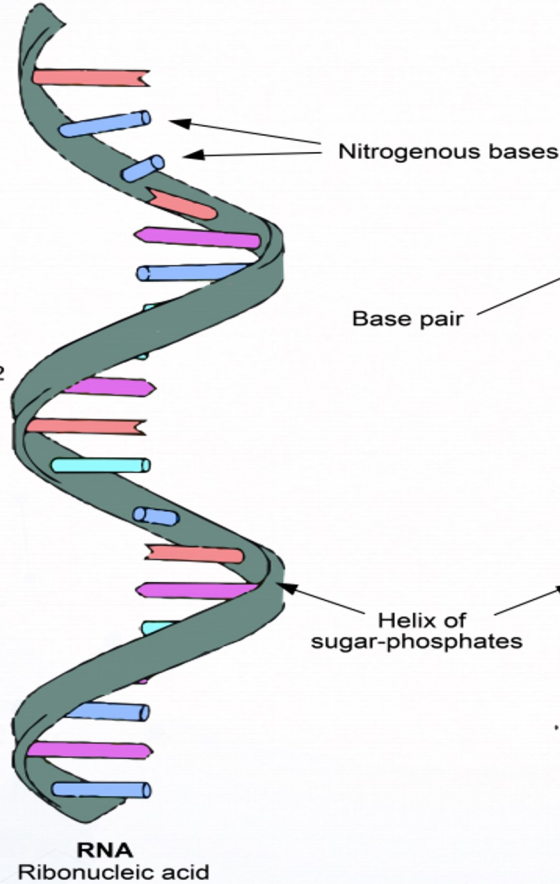
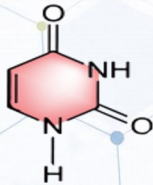
Guanine



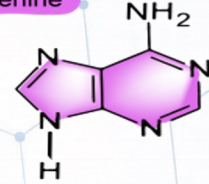
Cytosine



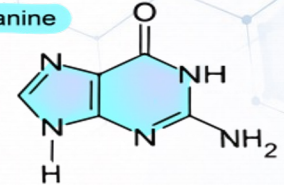
Uracil



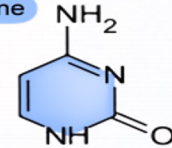
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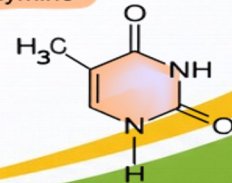
Guanine



Cytosine



Thymine



Promoter

Gene

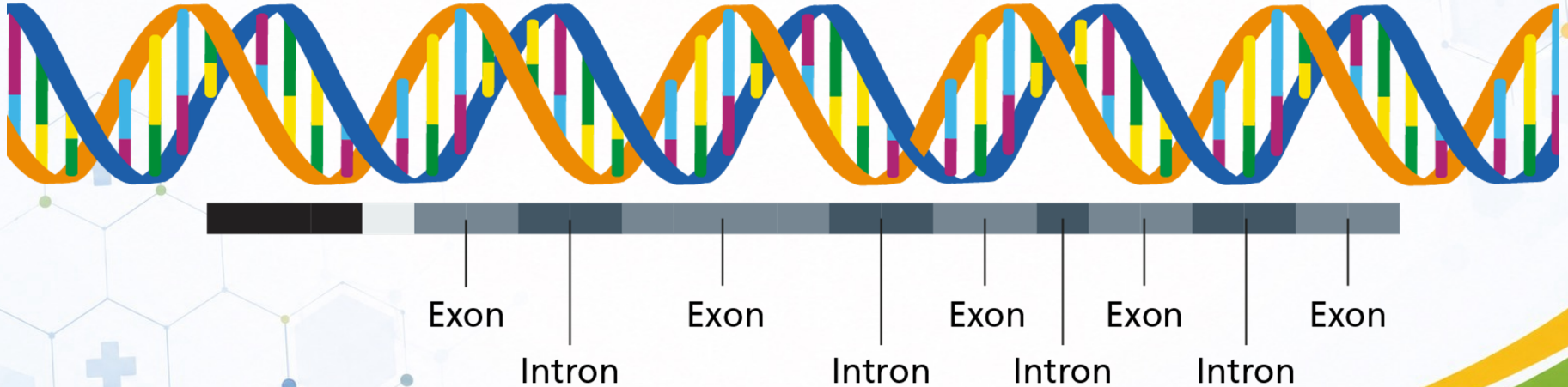
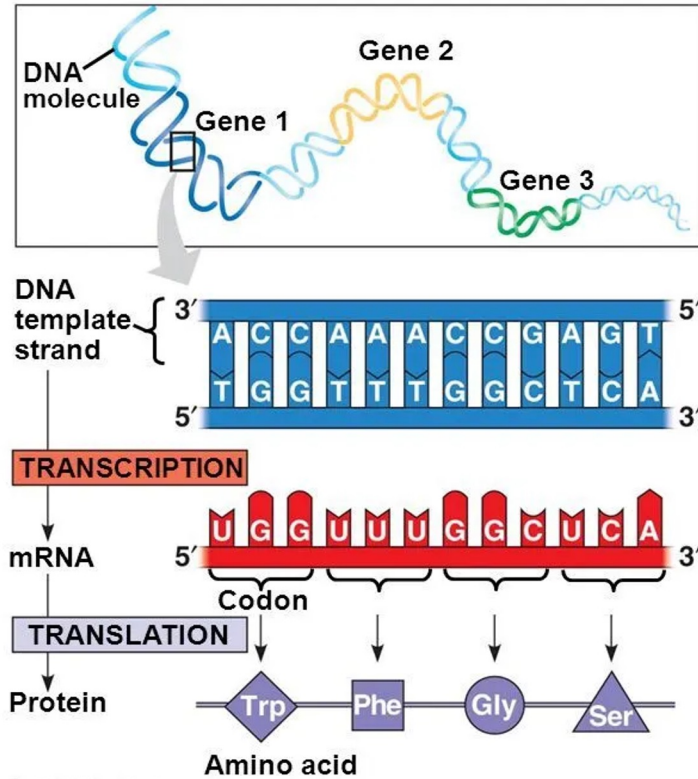
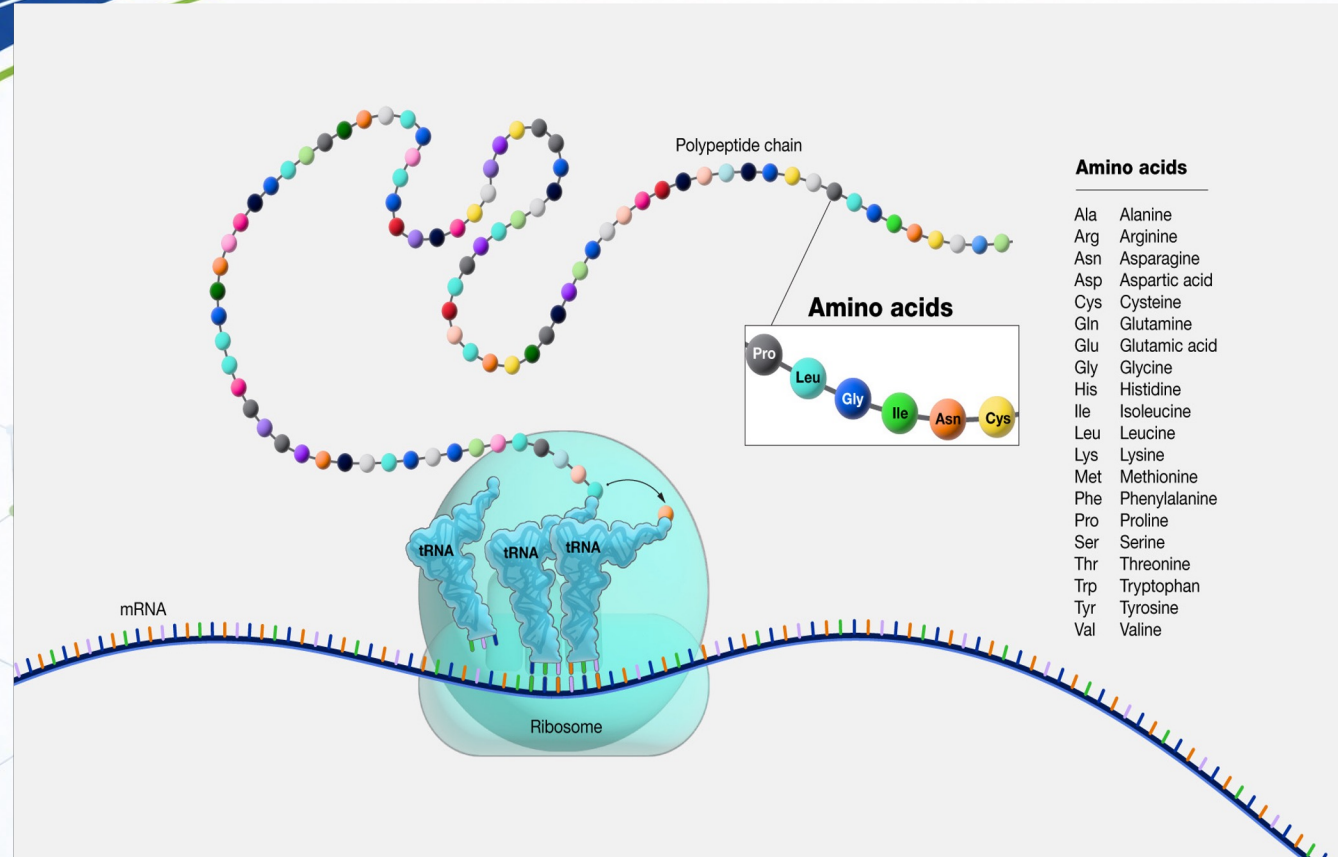


Fig. 17-4





Different flavors of amino acids

Essential
amino acids

Non-essential
amino acids

Conditionally essential
amino acids



Histidine



Isoleucine



Leucine



Lysine



Methionine



Phenylalanine



Threonine



Tryptophan



Valine



Alanine



Asparagine



Aspartate



Glutamate



Serine



Arginine



Cysteine



Glycine



Glutamine



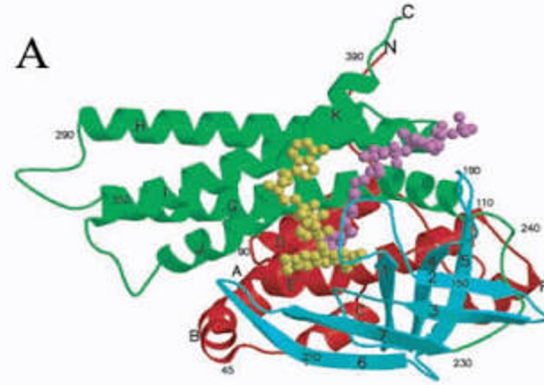
Proline



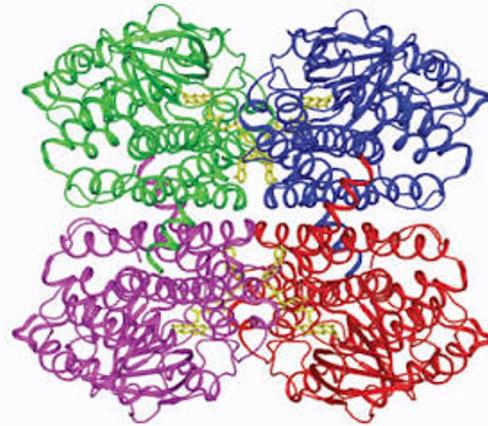
Tyrosine

SOURCE: T. WILSON & A. BENDICH /
MEDICAL CLINICS OF NORTH AMERICA 2022

KNOWABLE MAGAZINE



MCAD monomer

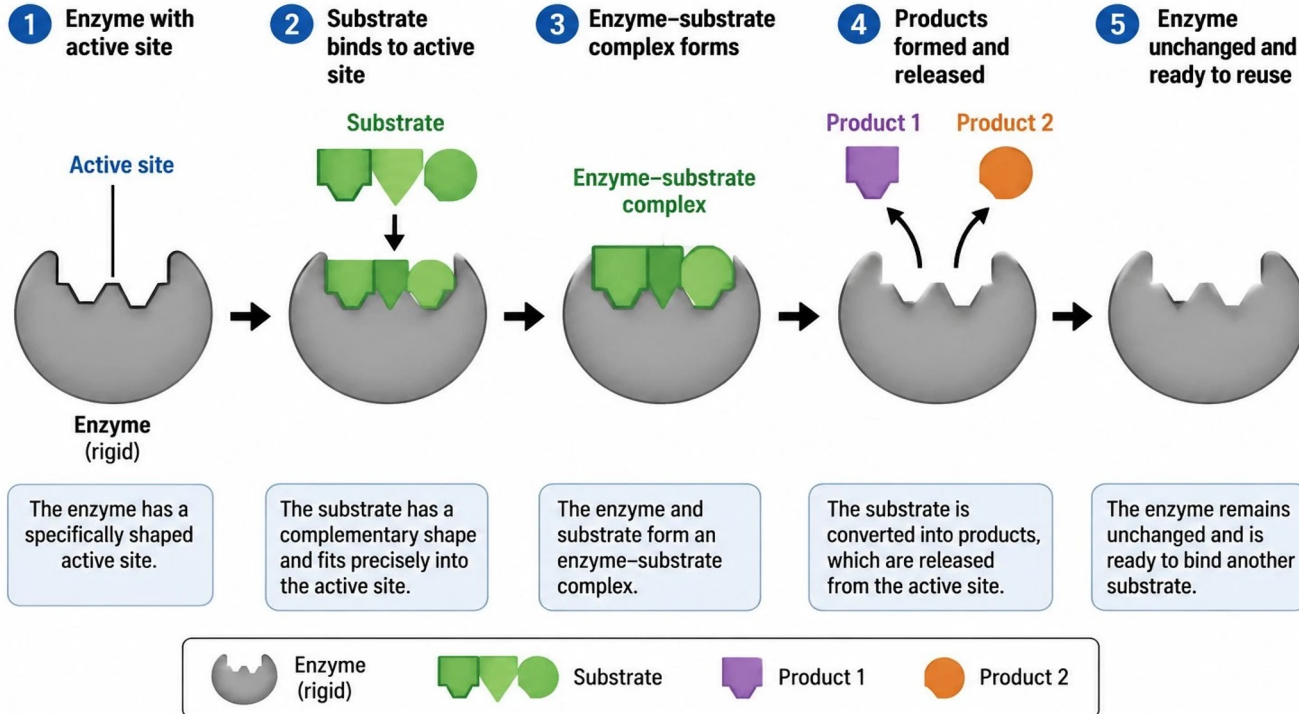


MCAD tetramer

What is an Enzyme?

- Enzymes are proteins. They are coded for in the DNA
- Enzymes lock onto a molecule -substrate (in this case a fatty acid) and change it
- If the amino acid order of the protein changes, the 3 dimensional structure of the enzyme may change
- If the change occurs in a critical place in the enzyme, it might change the shape enough that the components of the enzyme won't be able to join together (in this case make a tetramer), or attach to the substrate (in this case a fatty acid).
- This is the enzyme “lock and key” analogy

LOCK-AND-KEY MODEL OF ENZYME ACTION



So why the Variability in Severity??

- Some mutations change the shape of the lock A LOT - Severe Disease
 - Mutations in binding sites, or in shape important regions, or swapping for very different amino acids, or deletions or creating an early “STOP” site
- Some mutations change the shape of the lock a little - Milder Disease
 - Mutations outside binding or shape important regions, or swapping for very similar amino acids
- When a previously undescribed mutation is found, sometimes the effect can be easily predicted, but sometimes it is very difficult to predict
 - Computer programs, biochemical testing

What if My Child Has Only One Mutation?

- Mutations can occur in gene itself, gene promoters, or in intervening sequences
- Not all gene sequencing techniques can detect these mutations
- Methodology of gene testing is improving, but still can be improved. In some cases RNA sequencing can be helpful but is still not “routine” and often requires a tissue (liver) biopsy
- May get some help from biochemical testing

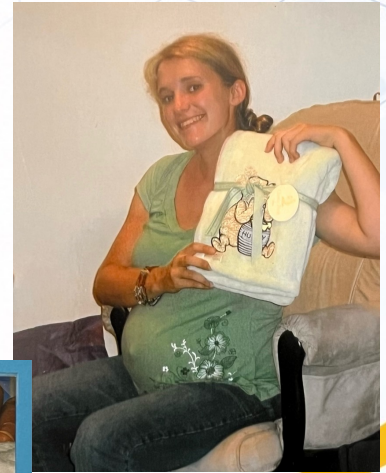
Why Do Some Clinics Do Things Differently?

- Medicine is an art as well as a science
- Doctors are a product of their experiences
 - The difference between “Evidence-Based” and “Eminence-Based” medicine
- Clinical Practice Protocols are helpful where good evidence exists (works better for common disorders than rare ones)
 - Opinion base protocols can be helpful but are not necessarily “truth”
 - Experience and networking are important

Everyone's Story is Different...

But there is always overlap and this overlap reminds us that we are not alone!

- Healthy pregnancy ended with atypical HELLP/acute fatty liver
- ICU on Life Support for 8 days
- Newborn Screening came back: LCHADD
- Relief because we knew why Mom had gotten so sick, but what would recovery look like?
- What is LCHADD???
- 3 weeks in the hospital



“I had Images of this movie...*Lorenzo’s Oil* seared into my brain...”



- Creating a methodology of care and advocacy
- Learning how to ask questions of doctors and seek collaboration

That First Year: Constant Feeds, Extra Appointments...What is DNA? *“I think I had a science class in High School...”*

Grief is REAL. It doesn't ever go away...it gets different.



Infants and Toddlers

- Why won't my child eat?
- When do I have to worry about eating?
- When do I call the PCP vs the metabolic clinic?

Infants and Toddlers

- Birth weight 7 pounds
100%



- Age 6 months 14 pounds
50%



- Age 12 months 21 pounds
33%



- Age 24 months 28 pounds



Children usually become picky eaters when they are toddlers (between the ages of 1 and 3). They aren't growing as rapidly during this phase, which means their appetite slows down too. This means they'll develop food preferences, and as a result, may become very picky about foods. Just know it's not just your child! Many toddlers go through this typical behavior.



“Normal” Eating Advice

- **Parent's Role:** You decide *what* food is served, *when* meals/snacks happen, and *where* your child eats.
- **Toddler's Role:** They decide *if* they eat the offered food and *how much* they consume.

Common Toddler Eating Phases

- **Picky Eating:** It is highly common for toddlers to refuse foods based on color or texture, or to suddenly dislike previously loved foods. Continue offering healthy options alongside familiar favorites.
- **Food Jags:** Expect your child to demand the exact same food for weeks. Keep providing variety without forcing them to eat it; they will eventually move on.
- **New Foods:** It can take 10 to 15 exposures before a toddler will even taste a new food.

But Eating in FAOD is Not Always “Normal”

Some FAOD (particularly long chain) seem to depress appetite or alter food choices

Children with more severe disorders who cannot tolerate even milder fasting need a more intrusive approach - consider a feeding tube for a child with an altered appetite or who has frequent illnesses

Milder disorders who are likely to only be triggered by significant fasting (such as gastroenteritis, etc) can backlash from forced feeding and create behavioral feeding problems that create more problems.....

Work with your clinic to manage this

When Do I Call the PCP vs the Metabolic Clinic?

- PCP - for problems not affecting calorie intake, medicine intake, and not causing changes in alertness
- Metabolic clinic - for management of calorie or medicine intake
- Sometimes you may need BOTH
- Example: Ear infection with upper respiratory infection and low grade fever
 - PCP for examination/ management of ear infection AND
 - Metabolic clinic if child's oral intake is down because of being ill
- Example: Vomiting/Diarrhea
 - Metabolic clinic, may need admission/ER visit

Pre-school and Early School Years

- Do they really get sick more than other kids?
- When and what to tell them about their disorder
- Effect on the rest of the family

Do they really get sick more than other kids?

Or does it just seem that way because any minor illness can put them in the hospital?

Some seem to be sick a lot, and some rarely.....

Do they really get sick more than other kids?

“Research shows that children with *mitochondrial disorders* produce a significantly weaker and less diverse antibody response to viruses because their B cells—the cells responsible for producing antibodies—lack the energy to survive the stress of fighting an infection

Viruses rely on a host's cellular machinery to replicate, demanding huge amounts of energy. To achieve this, viruses actively target and disrupt mitochondrial dynamics—the way mitochondria fuse and divide—to reprogram cellular metabolism in their favor. This exacerbates underlying mitochondrial dysfunction. ”

ANSWER FOR FAOD IS TBD

The most important thing to remember about the early years is be gracious with yourself!!!

You are doing all the typical toddler care, plus extra feeds, plus extra monitoring, plus learning and accepting your child's rare disease, plus educating friends and family! It's a lot!

- Find creative ways to educate those around you
- Learning **your** child's FAOD will take time and experience; but it will come!
- You won't have all the answers...ever. Lean into your experience and work with your child's medical team.
- **DON'T STOP ASKING QUESTIONS!**
- Your pediatrician is an important advocate! Keep them up to speed!



When and what to tell them about their disorder

Toddlers & Preschoolers

- **Keep it Brief:** Focus strictly on how it affects them right now.
- **Focus on the Routine:** Use simple phrases like, "Your body doesn't make energy, so you have to keep your body fueled up with the right food for you to make sure you can run and play."
- **Use Tools:** Use picture books, stuffed animals, or medical play (like playing doctor) to help them act out their experiences and demystify treatments.

When and what to tell them about their disorder

School-Age Children (Ages 7-12)

- **Explain the "Why":** These children can understand more complex biological concepts. Be open about their treatment plans and lifestyle adjustments.
- **Manage Social Anxiety:** Discuss what they want to share with their friends and teachers. Help them figure out exactly what to say if someone asks why they have to miss a party or take medication during the school day.
- **Give Them a Role:** Provide a sense of control by giving them age-appropriate jobs, like organizing their own pillbox, packing their medical bag, or simply describing their own symptoms to the doctor.

Effect on the Rest of the Family

- Peer support
- Family therapy
- Sacrificing one sib for the sake of the others



Our Approach to Early Education: LCHADD became part of the family...

- Encourage conversation and create an environment where questions are welcomed and encouraged.
- Be direct, and don't linger longer on a topic than a child wants to.

Practical Tips

- Make cooking fun! Cook together! **OFTEN!**
- Encourage them to trust themselves, and listen to their bodies.
- Books are great!
- Plan ahead for sick days!
- Support Calls



“Get creative with it! You might have challenging moments and need to pivot, but you can always get creative with it!” -Christopher Harry, age 8

Adolescence

- Adolescents are body-focused
 - How is my body the same?
 - How is my body different? What will happen to me?
- Adolescents tend to feel invincible, often deny risks and demand autonomy
 - Parental authority is established in early childhood
- "Social life and "fitting in" grow in importance – "I just want to be like everyone else", "This isn't fair"
- "Moodiness" vs "Depression"

Managing Rhabdomyolysis

- Problem that causes the most pain, hospital admission, fear, and missing out on important life events
- Some “frequent flyers” have been helped by immune modulation
- Some *really* “frequent flyers” might potentially be eligible for home IV glucose infusion when renal function and pain control are adequate, appropriate home services are available and covered by insurance, and clinic and parents are comfortable with it

Transition to Adult Medicine

- Few metabolic adult providers are available. Some clinics/hospitals restrict patients to age <18, 21 or 26, others are more lenient.
- Formal “transition” protocols exist for phenylketonuria, and for children in the foster care system
- Consider using a Medicine-Pediatrics (4 yr residency) or Family Practice (3 yr residency) for PCP
- Many hospitals now have some form of “Code Help” where families can initiate a meeting of the minds if they feel their concerns are not met

FOMO

- Professional Therapy
- Professional Therapy
- Professional Therapy
- Peer support
 - This group
 - Others (centerforchronicillness.org)



Early Discussions Help the Teen Years...

But Remember...

- As teens transition into adulthood their methodology of care and advocacy may be different than their parents.
- **Repetition is NORMAL.** Just because you discussed “it” at age 8, 10, and 13. You will need to rediscuss at 17!
- Teens are building “educational moments.”
- **“Own your FAOD!”**
- Think “Long Game”: How do we prevent burn out?



**Your FAOD will be a part of your life,
your child's life, and your family's life.
And it will change how you see the world
around you...**

**...But there is so
much beauty that we
are surrounded by
and having an FAOD
doesn't have to
prevent us from
exploring the things
we love!**

