This Q & A article is from BDSRA’s “Ask An Expert” Facebook Chat in the BDSRA Closed Facebook group for parents and caregivers.

\*Please note: the information contained in this material is intended to provide basic information to Batten families and caregivers. It is not intended to be, nor is it, medical advice for individual children. Parents and caregivers should consult the patient’s physician prior to changing medication, medical treatment or daily activities.

“Genetics 101”

Featured Expert:

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1. What is a recessive disease?
   1. We have two copies of every gene in our DNA (one comes from Mom and one from Dad). Any of these genes can 'go wrong' when there is a mistake or 'mutation' in the genetic code. In a recessive disease both copies of the gene need to be mutated to see the effects of the disease (as in affected children), in carriers (like all the parents) where one gene is mutated we see no outward sign of the disease. Two regular copies of the gene is also no effect.
2. Is there any correlation between diet and the progression of the disease? Or maybe asked a different way, would dietary input affect protein at the neuronal cellular level? High Fat VS High PROTIEN VS high carb. Not sure it's genetics related, But inquiring minds....
   1. There is no systematic scientific study that has proven any link between diet and disease progression (although some people promote a ketogenic diet), BUT like for all of us the better we eat the healthier we are likely to be. That doesn't mean changing diet will be any form of cure, but eating better is always a good thing.
3. Why is it that the disease seems to suddenly appear when no one else in the family has ever had it?
   1. That's a question I've been asked many times! The answer relates back to it being a recessive disease. Because there need to be two mutated copies of the gene to see the effects of the disease, you can have one copy of the mutation and pass it on from one generation to another without ever know it’s there. It just depends on meeting (and deciding to have kids with) someone else who also has one copy of the same mutated gene. Then there's a 1 in 4 chance that both parent will pass on this gene and have an affected child.
4. l have always wondered how an uncommon deletion came about. Is it possible that at one time, generations back it once was a common deletion?
   1. Quite how a mutation every arises in the first place is something of a mystery, but we think its likely down to a mistake when genes are copied during normal cell division. You can only pass on the mistake that occurs so if it’s a rare one then that gets passed on. Same for a common one. Why some mutations are more common than others depends (at least in part)on how much migration or moving about a particular group of people does. The more they stay together (and the less others join their gene pool) then a mutation can get reinforced in that population and become common.
5. After learning our son had CLN2 we had our other children tested as well. One is a carrier and the other is not. What are the odds that our child who is a carrier will come across a partner who is also a carrier of the same affected gene?
   1. Fortunately these gene mutations are relatively rare and the chances of meeting someone else with a mutation in the same gene is even rarer, which is why these diseases are thankfully as rare as they are. What is good is that you know that one of your children is a carrier so if/when they meet someone and think of having kids then their prospective partner can be carrier tested. If there is no mutation in the same gene then they can't have an affected child.
6. Can you explain what pre-implantation diagnosis is? I assume it involves testing an egg before or after insemination?
   1. Yes, that's pretty much right it's normally done 'in vitro' (fancy science talk for in a dish), so a couple may have several eggs fertilized in a dish and then you can have all the fertilized eggs tested and only implant the ones that don't carry a mutation.
7. In the extended family, who should parents make sure also get tested as a carrier?
   1. As I hinted at in one of my previous answers, knowing who is/is not a carrier is VERY important so that people can make an informed decision when they are having kids. So if the parents know they are carriers they will know they received this mutated gene from one of their parents (but they won’t know which). This is why it’s important to trace back a generation or two to work out who should/could be tested. For example all a parent's siblings may be carriers too (or completely unaffected with two regular copies of the gene), but which of their parents siblings might be carriers to. Obviously this can be an emotive issue but knowing your carrier status can be really important for knowing who may pass on the gene to the next generation (or who can't).
8. My mother was tested and is not a carrier. What's the best way to trace this backwards? I have one maternal grandparent living. My son's paternal grandmother is living but all great grandparents are deceased.
   1. If your mother is not a carrier then the mutation must have come to you from your father. I would be best to concentrate on carrier testing on that side of the family
9. For children who have an atypical form of Batten (for example they progress more slowly) does that mean genetically the disease is different than their peers with the same type or that their body is reacting differently?
   1. It's most likely down to the particular mutation that is present in the gene. So for example in CLN1/PPT1/Infantile some mistakes in the gene cause absolutely no PPT1 enzyme to be made (0% activity left so nothing can get broken down), but others are in a less important part of the DNA sequence so enzyme is made it just doesn't work as well. This might result in Infantile Batten disease that starts later or progresses more slowly. There are examples of this for CLN2/Tpp1/Late infantile too (and other forms of Battens to some extent). There is also the question of what other genetic background a person has. It's poorly understood, but at least in mice there are disease modifying genes that may influence how fast the disease progresses or how severe it is and it may well be the same in people.