

Poster Session Abstracts



INAUGURAL SCIENTIFIC MEETING

JUNE 21-22, 2021

MEET • SHARE • LEARN

(virtually)

Poster #1

Bone Status in Patients with Glut1 Deficiency Treated with a Ketogenic Diet: A Chilean Cohort

Cecilia Baeza

MD, MSc Pediatric Clinical Nutrition
Pontificia Universidad Catolica de Chile
Hospital Dr. Sotero del Rio
Santiago, Chile
clbaeza@uc.cl

Background: Ketogenic diet has been used as a first line treatment in patients with GLUT1D for fueling brain in a long-term basis. Bone health in these patients has been a concern due to the acid load associated with the diet, deficient calcium and vitamin D intake, and chronic antiepileptic drug (AED) use. Dual energy X-ray absorptiometry (DEXA) has been recommended as a gold standard for assessing bone mineral density (BMD). In the pediatric age group, the diagnosis of osteoporosis requires both a low BMD (defined as a z score < -2 SD) and a clinically significant fracture (defined as a long-bone fracture of the lower extremity, a vertebral compression fracture, or 2 or more long-bone fractures of the upper extremity). Earlier studies describe a progressive loss of bone mineral content in patients with refractory epilepsy subjected to multiple AED, but usually non ambulatory. In long-term follow-up studies, approximately 20% of children treated with KD (≥ 6 years) experience an increased incidence of bone fractures. Considering GLUT1D patients use KD as a life-long therapy, monitoring bone health is important as part of a comprehensive follow-up management.

Objective: The purpose of this communication is to characterize bone status in 10 patients with GLUT 1D treated with KD, and other factors that may contribute to maintaining a healthy bone.

Study design and sample: Cross-sectional study.

Results: The medical records of 10 patients (6 males) were reviewed. Four patients were on classic KD (3:1), and 6 patients were on a MAD diet with ketogenic ratios between 2-2.5:1. All patients had normal ambulation. DEXA was used for assessing bone status. Whole body bone mineral density z score (BMDz) was measured: 5 patients had normal values (group 1) and 5 patients had BMDz between -1 and -2.5 SD (group 2). In the latter group, one patient had a fracture after a high-altitude fall, but none had fractures of clinical significance. Patients in group 1 had been on KD between 1m and 20y (x: 5.2y, M: 1y) and those in group 2 between 4m and 5y (x: 1.7y, M 1y). All patients complied with calcium RDA at the time of DEXA (x: 1181 mg/d, M 1150). Eight patients had 25-OH-vitamin D values measured (x: 46.5, M:40 ng/ml), only 1 patient in group 2 had insufficient levels. Statistical analysis (Wilcoxon Test), show no significant difference between both groups in terms of time on KD and BMDz, and in terms of vitamin D levels and abnormal DEXA values ($p=0.59$).

Conclusion: In this GLUT1D cohort, patients with long term KD had conserved BMD, and patients with altered BMDz score had no clinically significant consequences due to this alteration. Factors that potentially contribute to this outcome are adequate calcium supplementation and vitamin D sufficiency, as well as ambulation which was probably a protective factor.

Poster #2

Positive Impact of a Modified Atkins Diet on Cognition, Seizure Control and Abnormal Movements in an Adult with Glucose Transporter Type 1 Deficiency Syndrome

Luisa Diaz-Arias

MD

Postdoctoral Research Fellow

Johns Hopkins University

Baltimore, Maryland

ldiazar1@jhmi.edu

Glucose is the primary energy fuel used by the brain and is transported across the blood-brain barrier (BBB) by the glucose transporter type 1 and 2. A GLUT1 genetic defect is responsible for glucose transporter type 1 deficiency syndrome (GLUT1DS). Patients with GLUT1DS may present with pharmaco-resistant epilepsy, developmental delay, microcephaly, and/or abnormal movements, with tremendous phenotypic variability. Diagnosis is made by the presence of specific clinical features, hypoglycorrhachia and an SLC2A1 gene mutation. Treatment with a ketogenic diet therapy (KDT) is the standard of care as it results in production of ketone bodies which can readily cross the BBB and provide an alternate energy source to the brain in the absence of glucose. KDTs have been shown to reduce seizures and abnormal movements in children diagnosed with GLUT1DS. However, little is known about the impact of KDT on cognitive function, seizures and movement disorders in adults newly diagnosed with GLUT1DS and started on a KDT in adulthood, or the appropriate ketogenic diet therapy to administer. This case report demonstrates the potential benefits of using a modified Atkins diet (MAD), a less restrictive ketogenic diet therapy on cognition, seizure control and motor function in an adult with newly-diagnosed GLUT1DS.

Poster #3

Ketogenic Diet Therapy Provision in the COVID-19 Pandemic: An Italian Experience

Cinzia Ferraris

PhD

University of Pavia

Pavia, Italy

cinzia.ferraris@unipv.it

Ketogenic diet therapies (KDTs) require constant nutritional monitoring over time both to ensure their effectiveness and to reduce the likelihood of short- and long-term adverse effects. A careful monitoring appeared necessary even during the COVID-19 lockdown, despite the impossibility of providing routine outpatient visits and hospitalization as a strategy of virus spread containment adopted by the Italian Government. Our hospitalization and care center is located in Lombardy, the Italian region most affected by the COVID-19 pandemic, and our center is one of the national reference centers for the treatment of epilepsy with KDTs. Parents and patients thus have showed major concerns both regarding the potential risks of COVID-19 exposure in a hospital setting and related to the altered contact with referring epileptologist and nutritionist. Therefore, it has been necessary to adjust our usual healthcare assistance introducing teleassistance and visits in video call, as suggested in the recent consensus statement for keeping people with epilepsy safe during the COVID-19 pandemic. Following this new strategy, in April, we contacted all our patients undergoing classic ketogenic diet (cKD) or modified Atkins diet (MAD), and we set up a follow-up video visit with our keto-team (child neurologist, nutritionist, and dietitians). Almost 20 visits were scheduled from May to July 2020: each visit had a duration of approximately 60 min. Parents were emailed two weeks in advance and were asked to provide the following information: 1) actual height and weight, 2) updated list of medications and supplements, 3) blood chemistry and abdominal ultrasound (when feasible), 4) food diary, and 5) ketonemia monitoring. During each visit, the neurologist, nutritionist, and dietitian discussed together with the patient and caregivers about patient care and then planned dietary and medical changes, arranging further tests if needed. During the lockdown period, the only tests that patients were unable to perform were indirect calorimetry, bone mineral densitometry, and bioelectrical impedance. Sometimes, obtaining blood tests turned out to be difficult, and the measurements of the patients' height and weight were imprecise. As predictable and observed in other adolescent and pediatric patients, even in this small subset of patients undergoing cKD, emotional and behavioral problems emerged during such a period of reduced social

connections. As far as cKD compliance during a subverted clinical routine, no major problems emerged except for one patient with a well-known history of poor compliance, who had more difficulties in following the diet by spending more time at home. On the contrary, a marked improvement of compliance was observed for one young adult patient undergoing MAD, who found it easier to adhere to the dietary regimen because of reduced meals out of home. Despite the reduction in physical activity that essentially affected all patients, no significant variation of ketonemia levels nor increase in weight parameters was registered. Patients' feedback regarding this follow-up via telemedicine was positive, and most families were pleased for not having to travel and risk their health. In conclusion, we suggest to offer to patients and their families the opportunity to perform a follow-up visit in teleassistance to provide clinical and treatment monitoring and to alleviate possible concerns as a bridge to the normal face-to-face clinic follow-up, which should remain the preferable practice when feasible.

Poster #4

Implementing a Ketogenic Diet for Glut1DS at a Psychiatric Facility

Rachel Finn

BS
Chef/Educator
Children's Mercy Hospital
Kansas City, Missouri
rfinn@cmh.edu

Introduction: Glucose Transporter Type 1 Deficiency Syndrome (Glut1DS) is a rare genetic disorder characterized by deficiency of a protein required to transport glucose across the blood-brain barrier. The current gold standard treatment for Glut1DS is the ketogenic diet (KD). The KD for Glut1DS is a medically prescribed diet tailored to individual patients. The KD diet can be a challenge to implement in a Psychiatric Residential Treatment Facility (PRTF). The purpose of this case study is to share the collaborative work between Children's Mercy Hospital (CMH) and a PRTF. This collaboration was necessary for the PRTF to accept for admission a patient with Glut1DS on a KD.

Methods: This case study is a 13-year-old male followed in the Epilepsy Center at CMH with the diagnoses of Glut1DS. The patient is an oral eater, follows a KD at a ratio of 2:1 and also has a dairy allergy. The patient required admission to a PRTF for behavioral and family concerns. Finding a PRTF that was able to provide a KD was a challenge, however one facility agreed to accept the patient for admission. The CMH multidisciplinary ketogenic diet team, consisting of a chef/educator, dietitians, social worker and nurse practitioner, coordinated with PRTF medical director to ensure medical needs and updates were relayed accurately between the two facilities. An epilepsy nurse practitioner ordered and reviewed appropriate labs to assess the safety and efficacy of the KD in the PRTF facility. A social worker provided education regarding specific behavioral concerns and needs. Ketogenic dietitians assessed nutrition needs and recommended adjustments in the meal plan based on growth trends and labs. A chef/educator created monthly menus with meals and snacks adapted to fit a modified form of the KD including adjusting recipes from grams to household measurements.

Results: KD related labs obtained 2 weeks after admission were found to be within normal limits including a therapeutic level of ketosis (beta-hydroxybutyrate level of 5.45 mmol/L). A weight loss of 1.5 pounds was reported 3 weeks after admission therefore an increase in calories was recommended. Another 1.5-pound weight loss was reported 7 weeks after admission, and it was determined the weight loss was likely related to behavioral food refusal. A follow-up telehealth appointment was scheduled with the CMH ketogenic diet team to help troubleshoot the challenges the PRTF staff were having with behavioral food refusal.

Conclusion: This case study indicates a modified form of the KD can provide an adequate level of ketosis in a PRTF setting. A modified form of the KD allowed the PRTF to prepare appropriate meals and snacks for a patient with Glut1DS. The patient experienced weight loss after admission. Regular communication between staff allowed this patient to get appropriate psychiatric treatment while maintaining an appropriate level of ketosis.

Poster #5

Old Drug, New Tricks: Diazoxide Use with Continuous Glucose Monitoring in the Management of Glut1 Deficiency Syndrome

Santhi Logel

MD

University of Wisconsin-Madison

School of Medicine and Public Health

Madison, Wisconsin

slogel@uwhealth.org

Learning Objectives

1. Describe the process of using continuous glucose monitoring (CGM) in diazoxide initiation.
2. Articulate the benefit of using CGM with diazoxide in the management of Glut1 deficiency syndrome (Glut1DS).
3. Recognize fluid retention as a potential side effect of diazoxide therapy.

Patient Presentation, Workup and Treatment

A 14-year-old girl with Glut1DS (c.398_399delGCTT:p.Lys133Phe) failed the KD due to severe nausea, vomiting, abdominal pain, and hypertriglyceridemia. Laboratory tests revealed CSF glucose of 36 mg/dL when blood glucose was 93 mg/dL (CSF/blood glucose ratio 0.39). Over the course of 3 hospitalizations targeting blood glucose levels of 120-180 mg/dL with diazoxide, EEG seizure activity decreased from 3 to 0 absence seizures per hour. CGM placement during the third hospitalization showed an average interstitial glucose of 157 mg/dL with glucose variability of 20.8% (goal <36%) on diazoxide dose of 7.3 mg/kg/day. This diazoxide dose is well within the typical range of 5-20 mg/kg/day used for hyperinsulinemic hypoglycemia. After discharge, CGM was used to adjust diazoxide doses 2-4 times a week to achieve target interstitial glucoses of 140-180 mg/dL. Repeat laboratory tests revealed CSF glucose of 55 mg/dL when blood glucose was 118 mg/dL (CSF/blood glucose ratio 0.47). Current diazoxide dose is 7.6 mg/kg/day, targeting interstitial glucoses of 90-110 mg/dL (glucose variability 17.1%). Most recent hemoglobin A1c was 5.7%. The patient continues to have no seizure activity after diazoxide initiation. Teachers have reported increased focus and improved reading comprehension on diazoxide. She is now an active child who participates in 4 sports. Her clinical course has been complicated by fluid retention, a known side effect of diazoxide, and managed with daily diuretics. Pediatric nephrology was consulted to balance fluid retention with increasing serum creatinine after initiation of diuretics. Her edema has been managed with a combination of hydrochlorothiazide (a thiazide diuretic), amiloride (a potassium sparing diuretic), and a sodium restricted diet. This requires frequent laboratory testing to monitor for hypokalemia, alkalosis, and renal dysfunction.

Teaching Points

1. This is the first report demonstrating CGM as a tool facilitating the safe initiation and real-time titration of diazoxide in Glut1DS patients who have failed the KD. Diazoxide addresses neuroglycopenia more physiologically by raising blood glucose levels and subsequently intracerebral glucose levels. CGM allows for more accurate titration of blood glucose with diazoxide while avoiding complications of hyperglycemia and thus introduces the possibility of diazoxide becoming a standard of care for Glut1DS.
2. CGM works through a small sensor inserted under the skin. The sensor measures interstitial glucose levels every 5 minutes. Interstitial glucose measurements generally correlate well with blood glucose levels, although can lag if blood glucose levels are changing rapidly.
3. Diazoxide causes fluid retention by increasing sodium reabsorption at the distal tubule of the kidney. This is why thiazide diuretics are used in the management of diazoxide-induced fluid retention. This case highlights the importance of monitoring electrolytes and renal function at baseline and frequently during diazoxide initiation as well as during diuretic therapy.

Poster #6 (Lightning Round Presentation)

Beyond Medical Practice: Recommendations for Neuropsychological Assessment in Glut1DS

Dr. Ludovica Pasca

IRCCS Mondino Foundation

Pavia, Italy

ludovica.pasca01@universitadipavia.it

GLUT1 transporter deficiency is associated to a complex phenotype, including epilepsy, movement disorder, paroxysmic events and cognitive impairment. All these aspects often lead to low adaptive behavior, poor quality of life, and emotional and behavioral disorders. A neuropsychological assessment including cognitive, motor, speech, language and Behavior competencies of these patients is recommended to provide a deep understanding of cognitive and behavioral functioning and to improve knowledge on the psychosocial profile of these patients. Moreover, a comprehensive neuropsychological assessment provides a baseline to assess changes in functions after Ketogenic diet therapy introduction and rehabilitative intervention. Our aim is to define a set of recommendations for the neuropsychological evaluation of patients with GLUT1DS. These indications are based on our clinical experience and on available evidence in literature and are thought to improve knowledge on educational, developmental and psychosocial profile of patients with GLUT1DS.

Poster #7 (Lightning Round Presentation)

Brain Microvascular Endothelial Cells are Sensitive to Hypoglycemia, and Partially Rescued by Ketone Bodies

Iqra Pervaiz

BE, MS

Texas Tech University of Health Sciences

Amarillo, Texas

iqra.Pervaiz@ttuhsc.edu

Introduction: Glucose represents the main source of energy of the central nervous system (CNS), as 20% of daily glucose intake is directed towards the brain. Glucose transport inside the CNS is occurring mostly via the blood-brain barrier (BBB) via the presence of several glucose transporter isoforms (GLUTs). Although glucose metabolism has been mostly investigated through the lens of the astrocyte-neurons axis, the fate of glucose and its metabolism at the BBB remains elusive. GLUT1 deficiency syndrome (GLUT1DS) is autosomal dominant haploinsufficiency characterized by mutations in SLC2A1 resulting in impaired GLUT1 expression and/or activity. Patients suffering from GLUT1DS suffer from epileptic seizures, intellectual disabilities, and movement disorders. As of today, medical intervention involving the adoption of a ketogenic diet (KD) remains the main course of action with satisfactory clinical outcomes. Yet, the effect of hypoglycemia and ketone bodies on the BBB function (including its glucose metabolism) remains unclear. This study investigates the effect of hypoglycemia and ketone bodies on barrier function and glucose metabolism in vitro.

Methods: CTR90F and CTR65M iPSC-derived BMECs were used in this study. Changes in GLUTs expression were assessed by immunofluorescence and flow cytometry, change in glucose uptake was assessed using ¹⁴C-glucose, change in glycolytic flux using SeahorseXF24 flux analyzer, quantification of beta-hydroxybutyrate using LCMS, and changes in the barrier function by transendothelial electrical resistance (TEER) and permeability to fluorescein. Cells were supplemented with ketone bodies (KB, 4microM beta-hydroxybutyrate, and 1mM acetoacetate) for 24 hours.

Results: Our data suggest that a decrease in glucose level upregulates the expression of GLUT1 and GLUT3 isoforms in our BMECs monolayers, such decrease was accompanied by a decrease in glucose uptake, alterations in tight junction complex, as well as a decreased cell metabolic activity and glycolytic flux resulting in a partial recovery of the barrier function under mild hypoglycemia and a partial recovery of the glycolytic flux. No significant changes in glucose uptake were observed in our model following treatment with KB. We also developed a simple and highly sensitive and selective LC-MS/MS method for the quantification of BHB in cell media.

Discussion: Our study suggests that BMECs may rely on glycolysis as the main source of energy, a decrease in blood glucose may have a detrimental effect on the barrier function. Supplementation with KB partially relieved such symptoms.

Poster #8 (Lightning Round Presentation)

The Journey of Diazoxide

Christine Shelsta

Glut1 Family Community
Richfield, Wisconsin
shelstafamily@gmail.com

Alaina was diagnosed with epilepsy at 2 years old after having tonic-clonic seizures. For seven years, she had increased movement issues, cognitive delays, and seizures despite many medications. In October 2015, Alaina was diagnosed with Glut1 Deficiency Syndrome. Initial attempts were made to manage with the ketogenic diet and modified Atkins diet unsuccessfully with multiple complications. In December 2017, we began the C7 oil trial with Dr. Darryl De Vivo. The trial ended in June 2019, but we continued to use C7 oil under the direction of Dr. De Vivo because we felt it helped with the movement part of the disorder. In October 2019, her seizures began to increase while taking C7 oil. We unsuccessfully tried many treatments. In spring 2020, we met Dr. Ellen Connor and Dr. Santhi Logel, who joined forces with Dr. De Vivo and Dr. David Hsu, to start diazoxide. Alaina began taking diazoxide on April 15, 2020. It wasn't an easy transition, especially during a pandemic. Because of symptoms Alaina developed, the doctors admitted her to American Family Children's Hospital in Madison, Wisconsin on April 28, 2020. During that hospital stay, we found her seizure activity dramatically decreased. But diazoxide brought on a new set of side effects (severe head pain; edema/weight gain - ankles, feet, face; hair growth). The doctors balanced her medications and stopped C7 oil. They also worked hard to have Alaina approved for a continuous glucose monitor (CGM). The CGM has been a game changer. It not only helps us monitor Alaina closer but also the doctors are able to recognize blood glucose trends, which helps them determine what is needed to maintain glucose levels. In the past year, Alaina has shown more improvement with diazoxide than any other treatment we have used. Before diazoxide, Alaina struggled with seizure activity, cognitive delays and movement issues. Since being on diazoxide, Alaina says, "I feel less confused, I can understand people more, my legs aren't wobbly; I have more energy to do things, I feel good!" We, as parents, have noticed less seizure activity and confusion, less movement issues and wanting to do more activity, and growth in her reading comprehension scores at school. Alaina continues to be watched closely by her team of doctors who work to balance her medications with diazoxide. Through this process, we have shared a document with her team of doctors that charts everything about Alaina's day, to help the doctors understand what we see from Alaina. We have had six hospital stays for monitoring purposes and/or diazoxide side effects. It has been a team effort by all involved with Alaina's care, but so worth it! To see how happy Alaina is and how she is excelling in the things she loves to do means the world. This is why we continue to work hard with her team of doctors to balance the side effects of diazoxide because we see all the benefits diazoxide has given Alaina.

Poster #9

Ketogenic Diet During Natural and Man-Made Disasters

Hailey Sinclair

MSN, RN-BC
University of Texas at Tyler
Tyler, Texas
HMS530@gmail.com

Glucose Transporter Type 1 Deficiency Syndrome (GLUT1DS) is caused by a mutation in the SLC2A1 gene and impacts the ability of glucose to cross the blood brain barrier and supply the brain with energy. The standard of care for GLUT1DS is a ketogenic diet. This low carb high fat diet provides an alternate energy sources – ketones – for the brain. February 13-17, 2021 Texas experienced an unprecedented winter storm. The ice and subfreezing temperatures overwhelmed the state's electricity infrastructure and over 4 million homes and business were without power. Roads were impassable, businesses were closed, and people were isolated at their home. This created unique hardships for people on a ketogenic diet to ensure they remained in ketosis with limited food options or inability to rely on electrical power. The purpose of this poster is to present how people on a ketogenic diet can prepare for natural and man-made disasters and strategies during the disaster to enhance success in staying in ketosis. Implications for the future include impacts of climate change and increased infrastructure vulnerability. Recommendations for ketogenic clinics and non-governmental organization awareness of medically necessary ketogenic diet will also be discussed.

Poster #10 (Lightning Round Presentation)

Precision Diagnostics for GLUT1DS Using Deep Mutational Scanning

Naeimeh Tayebi

PhD

postdoc research associate

Washington University

St. Louis, Missouri

ntayebi@wustl.edu

Objective: For many neurological disorders, the genetic cause is known but determining which variants are pathogenic is challenging. The accumulation of “variants of uncertain significance” and the failure to accurately classify genetic variants presents a growing crisis, particularly as sequencing before symptom onset becomes commonplace and for disorders in which therapies are available. To enable a paradigm shift whereby disease risk can be quantitatively determined, others and we are developing high-throughput tools to functionally determine the effects of all possible single nucleotide changes in a gene. We applied our new methods to study SLC2A1, the gene responsible for Glucose Transporter Type 1 (GLUT1) deficiency syndrome, which is essential to diagnose because the ketogenic diet is useful for treating associated symptoms. The GLUT1 deficiency syndrome encompasses a spectrum of neurological disorders, including early onset seizures with acquired microcephaly and cognitive impairment (classic type), paroxysmal choreoathetosis and dyskinesia, atypical childhood absence epilepsy, alternating hemiplegia, along with many related phenotypes. Although diagnosis has historically relied upon reduced CSF glucose, many patients are now diagnosed by sequencing. The goal of this research is to quantitatively determine the functional impact of all possible genetic variants in SLC2A1 and, by correlating with known pathogenic and benign variants, construct algorithms to accurately predict the risk of disease.

Method: We created a donor library consisting of 15 pathogenic and benign variants, as well as a donor library consisting of single variants encoding every possible amino acid substitution in SLC2A1 exon 10 using a reversibly terminated inosine mutagenesis method we developed and patented (Haller et al., Nat Methods, 2016). Variant libraries were introduced into the haploid cell line, Hap1, via multiplex homology-directed-repair (HDR) into endogenous SLC2A1 using CRISPR. Populations of cells were grown, sampled, and DNA sequenced at various time points to identify SLC2A1 variants that altered cell growth.

Result: Nonsense variants and known pathogenic variants dropped out of the population at early timepoints, while known benign mutations were never depleted. An SLC2A1 missense variant identified in a patient with childhood onset epilepsy had intermediate quantitative functional effects in this assay.

Conclusion: We have demonstrated the utility of this growth assay for generating comprehensive, quantitative functional data for a library of variants in SLC2A1, which will ultimately be necessary to improve variant interpretation for this and other treatable neurological disorders.

Poster #11 (Lightning Round Presentation)

Italian GLUT1DS Registry: Preliminary Report After One Year of Running

Costanza Varesio

MD, PhD candidate

Department of Child Neurology and Psychiatry

IRCCS Mondino Foundation

Pavia, Italy

costanza.varesio@mondino.it

Background: Glucose transporter type 1 deficiency syndrome (GLUT1DS) is a rare, genetically determined neurological disorder, for which Ketogenic Diet (KD) represents the gold standard and life-long treatment. Patient registries are rapidly growing to implement research. Registries are powerful tools providing insights and real-world data about the epidemiology, phenotypic spectrum, diagnostic biomarkers, effectiveness of treatments, and opportunities for quality improvement of healthcare delivery. This report describes the rationale, methods and initial implementation of the Italian GLUT1DS registry.

Methods: The Italian GLUT1DS registry is an ongoing retrospective and prospective, multicenter, observational registry, developed in collaboration with the Italian GLUT1DS association. It is based on an informatics flexible technology platform, structured according to the most rigorous legal national and European requirements for management of patient’s sensitive

data. It collects baseline and follow-up data on the patient's demographics, history, symptoms, genotype, clinical and instrumental evaluations, therapies.

Results: Five Centers in Italy have joined the registry and data of 52 patients of all ages have been entered. We will present the creation process and informatics infrastructure of the registry along with patient's clinical history. Details on age at diagnosis, genotype, cerebrospinal fluid glucose ratio, and ketogenic dietary treatments will be discussed.

Conclusions: Collaboration between clinicians, researchers, advocacy groups, and patients can create essential community resource infrastructure to accelerate rare disease research. The Italian GLUT1DS Registry is an example of such an effort.

Poster #12 (Lightning Round Presentation)

Characterization of Speech and Language Phenotype in GLUT1DS

Dr. Martina Paola Zanaboni

Department of Child Neurology and Psychiatry

IRCCS Mondino Foundation

Pavia, Italy

martinapaola.zanaboni@mondino.it

This **study aims** to analyze the oral motor, speech and language phenotype in a sample of pediatric patients with GLUT 1 transporter deficiency syndrome (GLUT1DS). eight Italian-speaking children with GLUT1DS (aged 4.6–15.4 years) in stable treatment with ketogenic diet from a variable time underwent a specific and standardized speech and language assessment battery.

Results: All patients showed deficits with different degrees of impairment in multiple speech and language areas. In particular, orofacial praxis, parallel and total movements were the most impaired in the oromotor domain; in the speech domain patients obtained a poor performance in the diadochokinesis rate and in the repetition of words that resulted as severely deficient in seven out of eight patients; in the language domain the most affected abilities were semantic/phonological fluency and receptive grammar.

In conclusion, GLUT1DS is associated to different levels of speech and language impairment, which should guide diagnostic and therapeutic intervention. Larger population data are needed to identify more precisely a speech and language profile in GLUT1DS patients.