## Project achievements

For the best chance of success, in any rare disease, and Batten disease is no exception, the basis for any future treatment must be based on science driven research of the highest quality. BATCure was designed to work in this way - to bring together a talented, diverse group with the necessary skills and expertise to offer a novel strategic and integrated approach to a set of very complex diseases.

*"I truly enjoy working with the top researchers from all around Europe who are devoted to developing treatments for Batten disease. My role within the project is to provide financial, contractual and administrative support and to ensure the timely delivery of all the results. Significant progress has been achieved.*

***Evghenia Scripnic, European Project Manager***

Young scientists have participated contributing to their continued involvement in rare disease research. One of the highlights was hosting NCL2018, the biennial international scientific meeting.

*"Cooperation, discussions and exchange of ideas, during the regular meetings and at international conferences between partners were inspiring."*

***Dr. Stephan Storch, UKE, Hamburg***

*"My laboratory was new to Batten disease research. Joining BATCure was challenging and at the same time encouraging, as metabolism was never previously associated with Batten disease. The opportunity to collaborate with widely reputed Batten disease experts within the UK and the rest of Europe brought to our group the new dimension of translational research. Thanks to this experience, we have now secured further funding to investigate other metabolic aspects of Batten disease. This has now become a new research line within my laboratory."*

***Dr. Juan Bolanos, USAL***

Progress has been made in the areas of drug discovery and the development of gene therapy approaches for CLN3, CLN6 & CLN7 disease. The group have utilised new technologies in science and diagnosis to great effect. These results are already emerging in scientific publications and will continue to do so over the next few years.

*"As a charity, being part of BATCure has allowed us to bring the family voice to a major research project. It has provided vital resources for us to strengthen our links with other Patient Organisations in Europe and worldwide, patients, their families and the professionals who care for them."*

***Heather Band, Scientific Officer, BDFA***

*"At BATCure we believe that we have taken science driven research forward for the benefit of all those affected by Batten disease. Our work on CLN3, CLN6 and CLN7 disease has improved our understanding of all aspects of the disease from basic research to improved diagnosis & clinical outcomes. We have worked efficiently together and have long-term ambitions for NCL research."*

***Professor Sara Mole, Project Coordinator, UCL***


For any BATCure enquiries, please contact Sara Mole, Project Leader
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**s.mole@ucl.ac.eu**

**www.batcure.eu** **BATCure** **BAT_Cure**



BATCure has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 666918


BDFA
BATTEN DISEASE FAMILY ASSOCIATION
*Together we WILL make a difference*

*Registered Charity In England and Wales 1084908 - Scotland SC047401*


BATCure

*Developing new therapies for Neuronal Ceroid Lipofuscinoses (NCL) commonly known as Batten disease*

# BATCure Project Report

## Batten disease

The Neuronal Ceroid Lipofuscinoses (NCL), commonly known as Batten disease, are a group of devastating life-limiting neurodegenerative diseases affecting children and young people for which, at present, there is no cure.

This disease encompasses a progressive loss of physical and mental abilities that includes visual impairment and blindness, severe epileptic seizures that are difficult to control, involuntary muscle spasms, speech loss and the deterioration of motor skills.

## Changing the outcomes for those affected by Batten disease

Batten disease is a rare neurological disease with only 1-2 thousand new cases being diagnosed worldwide each year. This presents a particular set of challenges when working towards finding successful treatments and ultimately a cure. As with many rare diseases the disease is not well known from a general clinical or public perspective. It is a complex disease and in order to develop treatments requires a multidisciplinary approach to maximise the chances of success.

BATCure focused on developing therapeutic options for three types of the disease CLN3, CLN6 and CLN7 disease. The BATCure consortium led by Professor Sara Mole, UCL, followed a clear path with a multifaceted integrated approach to the problem.

*"I put together the BATCure project consortium and acted as the overall Coordinator. In this role I ensured that the project proceeded as planned to achieve its aims. We have exceeded expectations with some exciting new science discovered along the way. All partners met regularly to share and discuss progress. Over the 3 years we have developed excellent working relationships and I know that collaborations will continue beyond the end of this award. It has been a lot of hard work but something that we will be drawing on in our research for many years to come."*

***Professor Sara E. Mole, BATCure Coordinator and Professor in Molecular Cell Biology at UCL***

## Patient involvement

A ground-breaking addition to this project was including the patient voice as central to all the work of the consortium, and the UK Batten Disease Family Association (BDFA) was invited to participate to represent all those affected by this devastating disease.

We are pleased to present the achievements of BATCure, featuring the diverse and different 14 partners, from 7 countries, involved in the project over the past 3 years.

*Professor Sara E. Mole, Professor in Molecular Cell Biology at The Mole Laboratory, UCL MRC Laboratory for Molecular Cell Biology*

One of the aims for the work of my Laboratory was to use yeast as the simplest cell model of a human disease. We made new yeast strains that carry mutations in their *'CLN3'* gene (called *btn1*) and used these to look at whether removing any of the other 5000 yeast genes makes the yeast grow better or worse. This gave us an insight into what is happening at a cellular level in the disease, which pathways are most important and whether they can be used to offset the effects of disease, as many of these genes work the same way in us.

We have begun to test whether manipulating these has the same effect in mammalian cells or in zebrafish, with Dr Claire Russell at the Royal Veterinary College (RVC).

We screened drug libraries in our Batten disease yeast model to see which drugs make the yeast grow better. The most promising compounds, along with many new compounds synthesised at the Latvian Institute for Organic Synthesis, were tested further in the yeast strains and human cells that model Batten disease. The most promising of these compounds are now being tested in zebrafish.

We looked at changes in the metabolism of yeast and patient cells with AcureOmics. We now have a better understanding of what CLN3 is doing within cells and have begun trying to understand what the different parts of CLN3 are doing in yeast and in mammalian cells, with Dr Lloyd-Evans at Cardiff University.

*Dr Clinton Monfries, the BATCure Researcher in the aquaria at the RVC, which houses many zebrafish.*

*The supervisory team consisted of Prof Ahad Rahim, Prof Robert Harvey and Dr Jason Rihel from UCL, Dr Claire Russell from RVC.*

One of the first steps for our work as part of the BATCure project was the generation of zebrafish which exhibit the hallmarks of Batten disease. We wanted the disease to be present in the embryo because we can quickly and easily test the most promising compounds, identified by our partners, from their work with cellular models of the disease.

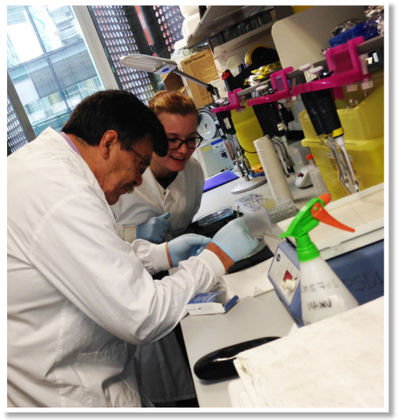
We generated zebrafish with mutations in CLN3, CLN6a and CLN7 genes in collaboration with UCL. Research does not always go to plan and surprisingly these zebrafish models either had a very mild form of the disease or no detectable disease. Therefore, they did not prove a good model to test new drugs. A different approach was needed and so we used our joint expertise to test the compounds in zebrafish where the amount of CLN3 was depleted in a transient way.

It was crucial to collaborate with partners such as UCL, TIGEM and Cardiff University to narrow down the numbers of candidate compounds, as they have the facilities to screen thousands of compounds. Of the first three compounds, two look promising as potential treatments, and we expect to test a further three or four compounds, continuing our collaborations beyond BATCure.

Having tested all of them on zebrafish lacking CLN3, we can then compare the results and test them in combination before selecting the most promising compound(s) to go forward for testing in Batten disease mouse models. I now have tried and trusted collaborators for future projects.

***Dr Claire Russell, The Royal Veterinary College***

*Heather Band and Laura Codd at the BDFA*



*Hands-on activities at the laboratory open day Kings College London.*

BATCure is the largest research project that the BDFA has been involved with and we were delighted to take a leading role in the project, ensuring that the voice of patients and affected families is central a major research initiative.

In the first 2 years, Laura Codd, the BATCure Project Administrator worked to establish links between the consortium, patients and their families and over 20 Patient Organisations and Foundations worldwide. The BDFA's work including managing communication of the project news, organising laboratory open days, developing resources, raising awareness and disseminating the project results.

In collaboration with our partners at UCL we designed and delivered our online patient survey, in 10 languages over 15 countries within the European Union. The survey focused on four main areas identified as the most important to families. Issues around diagnosis, access to quality information on research, participation in the International disease registry and to gain families' thoughts on potential barriers to taking part in clinical trials.

The response exceeded our expectations and the results are available on www.batcure.eu (family area). Thank you to all those who took part, our fellow Patient Organisations for their help in promoting our work and consortium members for their invaluable support.

It was an opportunity for us to bring the impact of living day-to day with a diagnosis of Batten disease directly to researchers. It is wonderful to read in this report how family stories are an inspiration and on behalf of all those affected we thank our BATCure partners for all their hard work over the past 3 years.

The project has exceed expectations, new and lasting collaborations have been made. The work of BATCure will continue beyond the end of the project, in June 2019.

***Heather Band, BDFA***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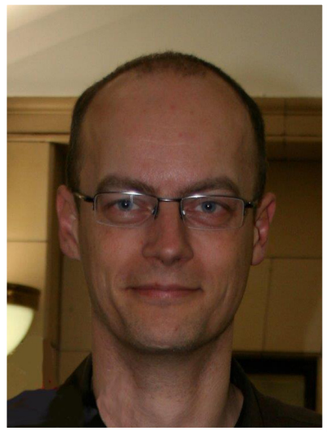
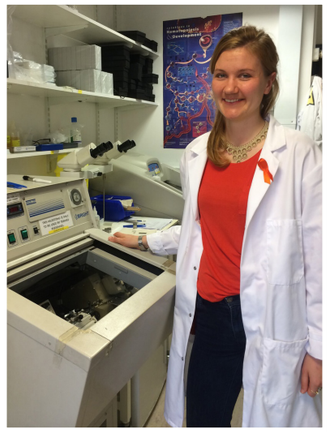


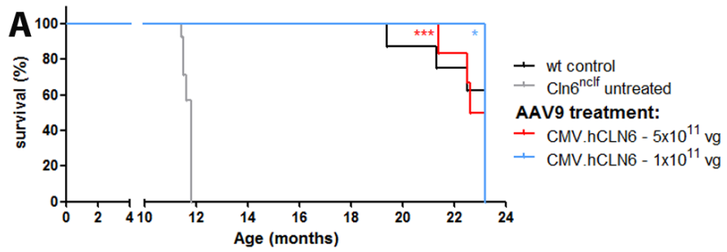
*Dr Sander Smith and*
*Dr Sophia-Martha kleine Holthaus*
*at UCL*



The aim of the gene therapy work was to develop new treatments for the brain and for the eye in all three forms of Batten disease investigated by BATCure. Building on our previous work on CLN6 gene therapy, we managed to develop effective vectors and methods to restore CLN6 to the brain and to the eye of CLN6-deficient mice, to normalise their lifespan and improve their mobility and their vision.

As the mouse model of CLN3 disease does not have brain disease, we only targeted their eyes in this project. We treated the retina (the layer of nerve cells lining the back wall inside the eye that senses light and sends signals to the brain) preventing the loss of nerve cells and the concomitant blindness. The combined evidence that CLN3 gene therapy can preserve nerve cells in the eye and that CLN6 gene delivery is effective, in the brains of CLN6 mice, makes us confident that CLN3 gene therapy for the brain is also a realistic prospect.

Working on the CLN7 mouse model, we showed that gene therapy can preserve vision and mobility and prolong the animals' survival. However, these results were less dramatic and less consistent than for CLN3 and CLN6 and there is an indication that there may be a risk of toxicity associated with CLN7 gene therapy. It is important that the underlying cause of this toxicity is identified before the treatment is tested in the clinic, and we will continue to work with other members of the consortium to discover what is happening in this model.




*CLN6 gene therapy to the brain of CLN6-deficient mice (red, blue) doubles the lifespan compared with untreated CLN6 mice (Cln6nclf, grey).*

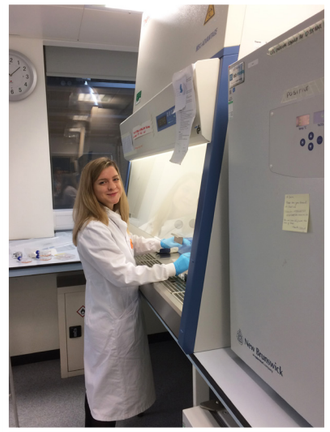
*After the treatment, the CLN6 animals live as long as mice without the condition (wild type, wt, control, black)*

"BATCure has allowed us to create a hub for Batten disease gene therapy expertise across four institutes at University College London, drawing in additional funding from other sources to develop therapies for two (hopefully soon, three) further forms of Batten Disease.

Across the consortium as a whole, the knowledge and resources have been shared freely, most notably the exclusive CLN7 mice shared by the University of Hamburg, forging new collaborations that will continue as the remaining questions are resolved and new projects start."

Dr. Sander Smith, Institute of Ophthalmology, UCL

*The BATCure team at Professor Tristan McKay's Lab at MMU (Professor in Stem Cell Biology)*



The McKay lab were tasked with generating stem cells from Batten disease patient cells, which had been previously taken with consent. From this we can "reprogramme" the cells to produce induced pluripotent stem cells (iPSC) which have two unique properties that make them ideal to study Batten disease.

1) they can grow and divide indefinitely, meaning they are an inexhaustible research resource

2) in the lab they have the capacity to mature into any functional cell type in the human body.

Consequently, iPSC from a patient with Batten disease, can be made in the lab to become brain neurons, glial cells (cells that protect neurons in the brain) or even heart cells.

We have now generated the largest repository of Batten disease iPSC lines in the world and these cells are available to all academic researchers worldwide working to find a cure for Batten disease.

In our laboratory we have been studying neural cells specified from iPSC lines generated from CLN7 patients. We have embarked on an exciting new study to map all the proteins expressed in CLN7 neural cells and compare them to unaffected neural cells, which will help us isolate groups of proteins that are either over or under-represented in CLN7 disease.

We have created conditions that mimic the stresses that CLN7 neural cells are known to be under as the disease progresses. This approach, called "proteomics", is capable of identifying and detecting changes in the quantities of proteins known to be involved in maintaining the health of cells in stressful conditions.

Some proteins function in the cell by sending signals to one another under certain conditions such as stress. Often these "signalling pathways" can be manipulated with targeted drugs to prevent the cell from damaging itself. We hope to use our proteomics data to discover a way of preventing CLN7 neurons from self-inflicted damage under disease-induced stress.

***Professor Tristan McKay***

*MMU team with the BDFA hosted a laboratory open day for affected families and professionals in March 2017.*

UCL

Manchester Metropolitan University

Orphazyme is based in Copenhagen, Denmark, and specialises in novel therapies for rare degenerative diseases. Our approach is based on augmentation of the naturally occurring protective responses that occur in cells in response to stress. Disease causes stress responses in cells and so our approach is to find ways that could prevent or help correct these events.

We develop small molecule inducers of chaperones, such as HSP70, and in late 2018 we completed a phase II/III clinical trial in Niemann-Pick Disease Type C, another very rare lysosomal storage disease. Being part of the BATCure has given us invaluable experience and new partners in the Batten disease field.

We have characterized the stress responses using cells which mimic a wide spectrum of clinical presentations for Batten disease, kindly provided by other partners in the BATCure consortium. Our studies have generated data that indicate a similar responsiveness of these model cells as found in our work in other rare lysosomal storage diseases.

While it is too early to tell whether this new knowledge has any potential in the treatment of patients with Batten disease, our work has generated new scientific insight that will aid future research efforts to combat this devastating group of diseases.

***Nikolaj H.T. Petersen, Sr. Science Manager***
***Senior Scientist Raffaella Magnoni, Orphazyme***

ORPHAZYME

*Marc at work in Barcelona*

*Guillermo Quintás at work in Valencia*

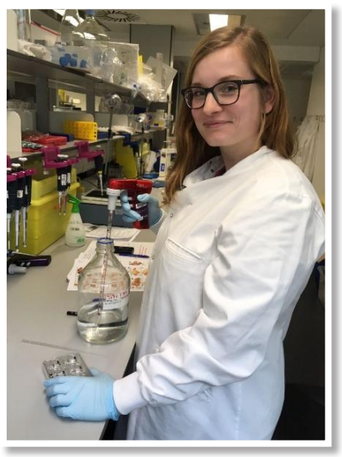
LEITAT Technological Center
managing your technologies | member of TECNIO

Leitat has contributed towards the goals of the project through two main activities. We developed and provided new research tools such as special antibodies to other consortium members to help to progress their research and ultimately to gain more knowledge on Batten disease pathophysiology. Our specific research effort has been focused towards the discovery of new biomarkers by analysing urine samples from patients. We wanted to look at the metabolites, proteins and DNA present in the urine to identify differences in that may be useful as markers for the disease in diagnosis, prognosis or follow-up. Among the results, differences in the urine metabolites have been observed. It requires further research to confirm these.

Leitat had no previous experience in research on rare diseases, much less rare paediatric diseases, such as Batten disease. It represented a scientific challenge as well as opening up a new research field to Leitat.

We have been honoured to be surrounded by such expert scientists in the Batten disease research field and have learned a lot. The involvement of the collaborators went above and beyond the scientific activities. We intend to continue to collaborate closely, as we did during these past 3 years, with UCL, University of Salamanca, Acuromics, The Royal Veterinary College and Universitaetsklinikum Hamburg-Eppendorf. It's been a fulfilling and scientifically enriching relationship, with many encouraging results being achieved, free sharing of scientific resources and profitable technical discussions.

***Marc Masa, Diagnostic Working Group Manager***
***LEITAT***



"It was an incredible experience and I am immensely grateful for the funding that allowed me to complete my PhD in this collaborative and inspiring research environment, which included working on mouse models from labs in both Hamburg and London. Bi-annual progress meetings always drove home that we were all working together towards a common goal. Meeting families of affected children at conferences and hearing their experiences really inspired and motivated me when I'd had a long day at the lab."

Charlott Repschlager
PhD student

All forms of Batten disease have a profound impact upon the brain and for many years we have mostly focused on these effects to better understand disease mechanisms in order to best direct therapies. However, it is now clear that Batten disease has effects outside the brain. Perhaps best known example is the early impact of CLN1 disease upon the spinal cord.

Studying pathological changes is the study of disease and is often referred to as the bridge between science and medicine and our work focused on when changes occur in the spinal cord and Peripheral Nervous System (PNS) in mouse models of CLN3, CLN6 and CLN7 disease. This is especially important, as these three forms are caused by mutations in transmembrane proteins. We will need to more precisely target therapies than in an enzyme deficient form of Batten disease like CLN2 disease.

Our results show that spinal pathology occurs in all three forms, but this occurs to different extents and progresses at different rates according to disease subtype. All follow a similar pattern with the nerve cell loss occurring late in disease, but this starts earlier in CLN6 and CLN7 mice than in CLN3 mice. In general, spinal pathology occurs at all levels of the cord in all three mouse models but is more severe at specific levels of the of the cord. In comparison we have found much less evidence for any pathological effects in the sensory PNS and it may be that we need to look further afield in the PNS. We did find evidence of storage material in the heart of CLN3 mice, which may underlie some of the defects seen in human CLN3 disease.

Now that we know that spinal pathology is present in every form of Batten disease, we can try to treat this and it will be important to test whether also directing gene therapy to the spinal cord will prove more effective than just treating the brain alone.

***Professor Jon Cooper***

KING'S College LONDON

P.S.D.L

CARDIFF UNIVERSITY
PRIFYSGOL CAERDYDD

At Cardiff university we used our expertise in how cells with Batten disease communicate with each other compared to healthy cells. Communication between cells in an organ, like the heart for example, is critical as it maintains the normal rhythm of the heartbeat.

Using cells that our colleagues in BATCure provided a key finding is that CLN3 is providing an important role in maintaining the ionic balance of the lysosome, a part of the cell responsible for recycling and communicating nutritional balance with the rest of the cell. We have also identified some compounds that help cells struggling to do this.

***Dr Emyr Lloyd-Evans***
***School of Biosciences, Cardiff University***

*Dr. Stephan Storch*


"Collecting patient data is vital for clinical trials but is important for many other reasons – current patient data can identify early indicators of disease and help improve diagnosis."

Dr. Angela Schulz

We have conducted studies on the molecular basis of CLN7 disease using a mouse model for the disease. In this model the CLN7 protein is truncated leading to a non-functional protein.

We focused on the main question why the loss of the CLN7 protein leads to lysosomal dysfunction and subsequent damage of neurons especially in the brain and in the eye. For our analyses we used cultured primary cells derived from the CLN7 mouse model. This revealed that many other proteins were depleted in the absence of functional CLN7 and specific lipids accumulate in the brain.

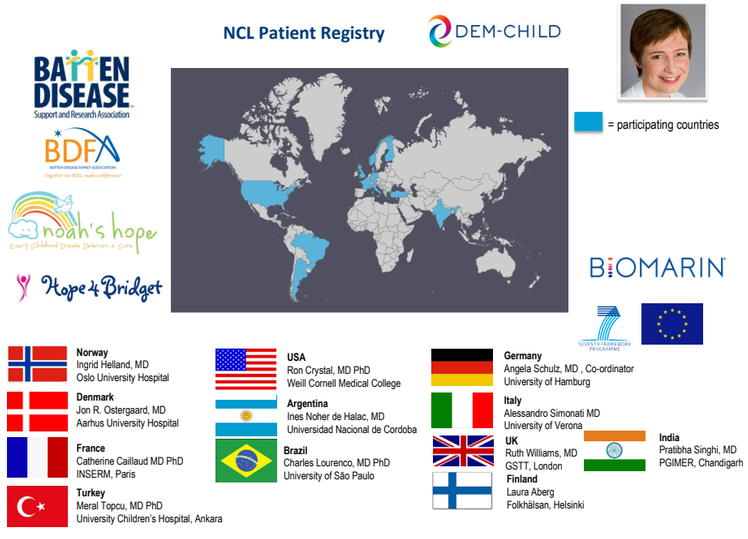
In the frame of BATCure we have provided our CLN7 mouse model to different research groups in the UK, Spain and Italy. The complementary expertise and resources of the different BATCure partners in the fields of gene therapy, small molecule screening, metabolic reprogramming and neuropathology contributed much to the progress of our project. Our interactions at project update meetings were inspiring.

We hope that our research will contribute to a better understanding of the mechanisms involved in CLN7 disease and hopefully will lay the basis for treatment options in the near future.

***Dr. Stephan Storch, UKE***

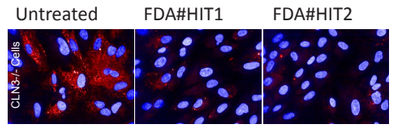
Our role at The Universitätsklinikum Hamburg-Eppendorf (UKE), being a clinical centre with long-standing expertise in the diagnosis and management of neuronal ceroid lipofuscinoses (NCL), Batten disease involved regular and holistic assessment of patients, for example by MRI and psychiatric assessments.

Dr Angela Schulz, a paediatrician and has run the NCL clinic at the UKE Children's Hospital for more than 10 years and coordinates the recruitment of NCL patients, collection of patient data for natural history studies for the project. She also coordinates the international DEM-CHILD NCL patient database.




UKE HAMBURG

*The high content screening team at the TIGEM facility*




*Compound hits reducing the accumulation of lipids in a cellular model of CLN3. CLN3-depleted cells were treated with DMSO (untreated condition), or with compound 1 or 2. Cells were fixed and stained and imaged.*

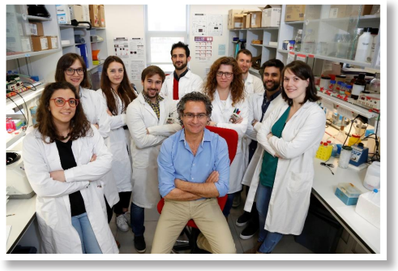
Our laboratory is focused on the study of lysosomal storage disorders (LSDs) and in the development of innovative therapeutics using cell-based high content imaging approaches for drug discovery. Together with other BATCure project partners (Sara Mole at UCL), our laboratory developed assays in a variety of cellular models of Batten disease to identify compounds with the potential to treat the disease.

We developed a cell-based primary assay to measure lipid accumulation (a marker for disease) in human cells depleted of CLN3 and CLN7. We have identified FDA-approved compounds able to reduce this accumulation as shown opposite.

In collaboration with partners at the Latvian Institute for Organic Synthesis (OSI) led by Prof. Maija Dambrova, we are using compound hits as reference structures to generate analogs with improved potency in our assay. By testing these hits in secondary assays aimed to determine the mechanism of action, we found that lipid clearance might be mediated by activation of lysosomal and autophagic activity (the process that allows for the orderly degradation and recycling of cellular components). From this we are currently testing one of the best compounds in a mouse model of CLN7 in collaboration with BATCure partner (Juan P. Bolanos, USAL).

***Dr Diego L. Medina, Head of the high content screening facility at the Telethon Institute of Genetics and Medicine (TIGEM, Pozzuoli-Italy), and Professor of cell biology at the University of Naples, Federico II, Italy***

TELETHON INSTITUTE OF GENETICS AND MEDICINE
tigem



*Professor Juan Bolanos (seated) and his team at the Institute of Functional Biology and Genomics (IBFG), University of Salamanca. Dr. Irene Lopez-Fabuel (first on the right) is the BATCure postdoc*

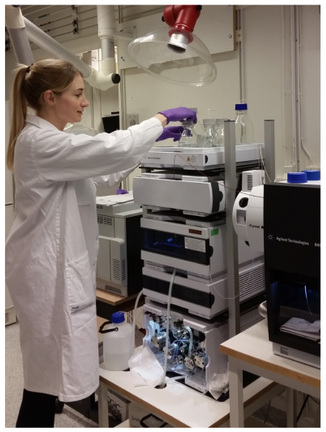
Metabolism comprises all chemical changes occurring within cells in a finely balanced and coordinated manner. Amongst other things, metabolism ensures the energy supply required by cells to make tissues and organs to work properly. Neurons are brain cells requiring a vast and continuous amount of energy to sustain neurotransmission, i.e. the work that neurons do to keep the brain alive. In essence, our contribution within the BATCure consortium was to identify that neurons affected by Batten disease undergo profound changes in metabolism strongly influencing energy supply.

Inside cells, mitochondria are little "engines" that optimize metabolism to produce energy in a highly efficient way. Using a mouse model of Batten disease, in particular, the CLN7 type, we observed that neurons accumulate inside very large (swelled) mitochondria, which unfortunately are damaged and cannot function correctly.

This problem further contributes to the loss of neuronal energy supply and, eventually, to degeneration. Importantly, we found a specific metabolic alteration (a target) in CLN7 Batten disease mice that may account for many of the energetic problems that take place within damaged neurons. We are currently developing a pharmacological approach to try to rescue this effect.

***Professor Juan Bolaños , Research Leader based at the Institute of Functional Biology and Genomics***

VNiVERSiDAD D SALAMANCA
CAMPUS DE EXCELENCIA INTERNACIONAL



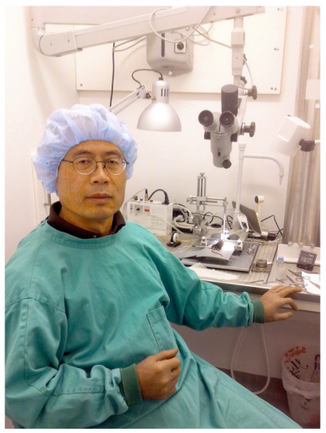
*Dr. Kate Bennett in the lab in Sweden.*

Metabolomics is the large-scale study of small molecules, commonly known as metabolites, within cells, biofluids, tissues or organisms. AcureOmics used their expertise in this field to identify disturbed biochemical pathways in CLN3, CLN6 and CLN7 diseases. This knowledge is being used to both help assess and design novel treatments that act to normalise the disturbed biochemical pathway.

This work will contribute to improve how the effect of ongoing treatment is monitored.

***Dr Kate Bennett***
***Professor Torbjörn Lundstedt***
***Associate Professor Katrin Lundstedt-Enkel***

*AcureOmics supporting the BDFA for Batten disease awareness day.*



*Senior scientist Fu-Hua Wang, MD, PhD in the surgery room.*

We are a preclinical contract research organization (CRO) offering advanced services and collaborative projects in Central Nervous System (CNS) pharmacology, neurochemistry and bioanalysis. Our mission is to serve and research organisations and pharmaceutical companies to accelerate the process of drug discovery, evaluate mechanisms of drug actions.

Pronexus core expertise is focused on studies using in vivo microdialysis, which is a way to mimic a blood vessels, and in experimental models of CNS and metabolic disorders.

We offer a range of assays and services for quantification of neurotransmitters, metabolites, drugs, neuropeptides and proteins in biological samples such as plasma, urine and tissue extracts. Our role was to evaluate whether the selected potential therapeutic compound, developed by our partners would be able to alter the biomarker molecules we had identified as important in the disease progression.

We studied the effect of the compound in the brains of the CLN7 mouse model and compared this to the levels in the wild type mice. We were not able to detect a difference and further work is needed. One explanation may be that the drug needs to be given earlier in the disease course or at higher dose.

***Dr Jan Kehr, Pronexus Analytical***

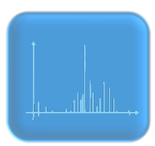
*The team at OSI "go orange" on Batten disease awareness day in 2017!*

**Administration**

**Sampling**

**Sample preparation**

**Bioanalytics**



**Data analysis**

Latvian Institute of Organic Synthesis

At The Latvian Institute of Organic Synthesis, (OSI) we have many years experience and expertise in making new compounds specifically designed to treat a variety of diseases. TIGEM and UCL carried out drug screens in cellular models of Batten disease to identified promising compounds. We then redesigned the best ones using a medicinal chemistry approach, with the aim to improve their properties. As a result, 121 new compounds were synthesised and then further tested by our BATCure partners.

In Batten disease, it is important to know how well these new compounds can enter the brain (bioavailability). We used mouse models of Batten disease to measure this to identify the best candidates for further testing by ourselves and our partners. We also assessed any potential toxic effects of the new compounds.

Another approach is to look at the metabolic profiles, in models of the disease, AcureOmics lead the way. This involved new drugs we had developed and those suggested by the results from several partners, TIGEM, UCL, and Pronexus Analytical. We were interested in whether the administered drugs change the blood metabolite profile in a favourable way in our different models of Batten disease.

Participation of OSI researchers in the BATCure project brought us to the rare disease field and the challenges in relation to the drug discovery programs for such diseases where no cure is currently available and a single drug target is difficult to identify. Our collaboration with those in the group to accumulate data about the mechanisms of a disease, combined with our drug discovery approaches has provided evidence that this is a way forward to new treatments.

"I enjoyed communicating with the BDFA and I am now sharing this experience, about the involvement of patient organisation in a research project, with my colleagues here in Latvia and internationally. It is motivating and makes the research questions we are trying to solve more meaningful."

***Prof Maija Dambrova, OSI***


*Prof. Maija Dambrova, Head of the Laboratory of Pharmaceutical Pharmacology and the OSI researchers make "orange synthesis" for the Batten Disease Awareness Day, June 2018*