Can you tell us more about your lab environment at the University of Salerno?

The University of Salerno (Università degli Studi di Salerno) is a particularly heterogeneous and rich environment in terms of research, intended as the “noble activity operated in order to extend the global scientific and technological knowledge, based upon advanced methods and merit, with the ultimate scope of making life better and the world a better place to live” (as reported on a plate in the main University hall).

The University of Salerno is one of the newest and most involved academic institutes in Italy, collaborating in a number of national and international research programs, constantly open to new technology transfer and application of scientific results.

Salerno has been the birthplace of the ancient Salerno Medical School, terminated under Gioacchino Murat in 1811. Later, in 1944, the University main building was erected by Giovanni Cuomo, and became the official location for the Faculty of Medicine in 1968. Within a few years the Faculty of Medicine was surrounded by a number of new institutes which contributed to the creation of the new academic environment. In 1969 the Faculty of Italian Language and Philosophy was established, as well as Economy and Commerce in 1970, Mathematical, Physical and Natural Sciences and Law in 1983, Engineering in 1983, Pharmacy in 1991, Political Sciences in 1992, Foreign Languages and Literatures in 1996 and the new Faculty of Medicine in 2006, in collaboration with the well-known Faculty of Medicine from the University Federico II of Naples.

The campus now hosts over 40,000 students, with increasing numbers every year, especially from other regions such as Basilicata, Puglia, Molise, Calabria and from abroad, thanks to a large number of international research and formation programs.

At the moment, the University of Salerno offers 60 active courses, 29 departments and 6 research centers.

How is your research funded?

Our research is currently funded by:

- European structural fundings and “Quadro” programs
- National fundings and “MIUR” programs
- Regional fundings and Region Campania and local agencies programs

The Central Administration Support Offices for research are:

- National Funding Research Office
- European Funding Research Office
- European Special Project Office
What is your lab working on at this time?

At this time our lab is working on testing the efficacy of a novel ketone salt formula, in collaboration with Dr. Dominic D’Agostino’s laboratory at USF in Tampa, Florida. We expect to confirm the hypothesis that ketone salts are highly efficient against seizures. This study is strictly correlated to two previous works, recently completed and submitted for publication, in which we observed a significant increase in the latency to seizure on a pentylenthrazole (PTZ) rat model of epilepsy, after the oral administration of ketone ester. Pentylenethrazole, also known as Metrazol, Pentetrazol, Pentamethylenetetrazol and Cardiazol, is a powerful circulatory and respiratory stimulant and high doses of it cause convulsions (Meduna et al., 1934).

The objective we are aiming to achieve is to prove and quantify the anticonvulsant efficacy of a chronically (10 days, twice/day) orally administered mix of ketone salts and medium chain triglycerides (MCT) in Winstar rats.

We will parallel our previous set of experiments and use a total of 40 male adult Winstar rats (Rattus Norvegicus), divided in four experimental groups:
- 10 controls (administered with 1 ml of water)
- 10 MCT (administered with 1 ml of MCT oil)
- 10 Ketone Salts (administered with 1 ml of ketone salts)
- 10 MCT + Ketone Salts (administered with 0.5 ml of MCT + 0.5 ml of ketone salts)

The day of the experiments, rats will be anesthetized with urethane, then implanted with cortical electrodes. Their phemoral vein will be catheterized and rats will be gavaged with one of the previously described substances. 30 min later, PTZ will be injected with i.v., then the rats will be sacrificed with a urethane overdose. Blood samples, brains and abdominal organs will be collected for histologic analyses. We will calculate the subgroups’ latency times to seizure via their electroencephalogram records and blood ketone levels at the moment of PTZ administration will be regularly monitored.

In addition, we have the honor to announce the arrival of Madison Stoddard from the Massachusetts Institute of Technology (MIT) for a 3-month internship at the University of Salerno. Madison will be running most of the above described experiments. Madison is a neuroscience major at MIT and her brother, Dalton, has Glut1 Deficiency.
When will the proposed Glut1 Deficiency studies begin (or when did they begin)?

We expect to get the study started at the very beginning of June 2014. We are currently in the process of ordering animals, reagents and drugs, and because we are collaborating with a number of departments, this process has required some time.

When do you expect them to be completed and the results shared?

We predict to have the first studies completed and the results shared within the end of September, before the 4th Global Symposium for Dietary Therapies for Epilepsy and other Neurological Disorders for Health Care Professionals, held in Liverpool, UK.

What potential does this research have to impact the big picture for Glut1 Deficiency (and perhaps even more conditions)?

One of the harshest issues for Glut1 patients is clearly identifiable with epileptic convulsions. By testing the anticonvulsant efficacy of Ketone Esters and Ketone Salts we daily strive to provide one or more compounds that, in association with a correct metabolic approach and an individually designed diet, are able to improve the Glut1 deficiency patients’ quality of life. Our present research specifically addresses the sometimes increasing needs of patients and their families.

At the same time we hope these efforts will be integrated with other researchers’ determination. Hopefully with the results obtained in this field, similar neurological diseases will receive more attention and funds. Knowledge of this pathology is what brings experts together, and unfortunately Glut1 deficiency is not always correctly diagnosed yet, especially in underdeveloped countries. Our recent collaboration with the Charlie’s Foundation and Matthew’s Friends is encouraging us to keep striving to pave the way towards the solution. Also, what gives us the most energy is meeting in person the kids and their families so we can exchange ideas, share opinions with them and listen to their precious stories.
How does this project reflect your overall approach to research and medicine?

The metabolic approach is sometimes underestimated. The modern society is used to obtaining an effect by targeting the right receptors, thus using drugs and medicine. This is a canonic and effective approach, but as in almost all pharmacological approaches, it causes side effects. By modifying our metabolism from the roots, we aim to create that beneficial switch that would firstly avoid the patient a number of side effects, and then make him/her feel better.

We believe that ketosis is the common cure for a number of degenerative and non-degenerative pathologies, simply because it allows our organism to work on “clean fuel”, AKA fats and ketone bodies. By testing our ketone supplements (esters and salts) against epileptic models of seizure, we strive to develop metabolic agents able to improve the efficacy of a ketogenic diet, or even to replace it, as we are all aware of how sometimes its compliance can be problematic. The main goal for our ketogenic supplements is to provide more high energy ketone bodies to enhance the standard metabolism.

What can the Glut1 Deficiency community do to be helpful to you and where can we find more information?

The Glut1 Deficiency community is crucial in order to understand whether or not we are heading in the right direction. It is thanks to Glut1 Deficiency patients that we know how our work and findings impact their life. From this perspective, a great example is represented by the numerous studies of palatability. One of our research lines addresses the use of ketone supplements as anticonvulsant agents. The only way we can get to know whether or not these supplements are appreciated and drinkable is asking patients. Also, the Glut1 Deficiency community can help us understand and recognize eventual drug side effects by reporting their personal experiences at home or at the hospital.

For more information:

http://www.unisa.it/english/index

http://ketonutrition.org/

http://health.usf.edu/medicine/mpp/profile.html?person_id=24854&Dominic&DAgostino