

Evaluation Report for DiabetesLu, LU (Excellence of Diabetes Research in Sweden – EXODIAB)

Research output

The overall grading of research output for EXODIAB in an international perspective *is on the frontline*.

Scientists from EXODIAB have published a large number of scientific articles since 2010, many of them in top international journals such as Nature Genet, Nature, Cell Metab, Cell, PLoS Med, PLoS Genet etc. Importantly, several of these studies were groundbreaking, providing novel and very relevant information for the understanding of the pathogenesis of diabetes. Key areas where important papers were published by EXODIAB include human pancreatic islet biology, human genetics of type 2 diabetes, systems genetics, transplantation etc. Of note, there is a progressive increase in the number of publications from 2010 to 2013, with preservation of quality. In total the unit published 949 publications, with an estimated coverage in the WoS of 95%. The proportion of these being of national and international collaboration is 55% and 64%, respectively. The proportion of publications in the top 10% and top 1% is 12.8 and 0.6%, respectively. Since the first exceeds the 10% value, this indicates that a greater than expected number of the unit's publications are amongst the best in the world for this field in the top 10% level journals. The bibliometric analysis shows a mean citation rate of 1.37, indicating that the unit's publications are cited above the world average by 37%. Their established website 'diabetesportalen' has reached 25,000 monthly visitors as of November 2013.

The EXODIAB teams are international leaders in diabetes research, particularly on the pathogenesis of type 2 diabetes and systems genetics. They have published breakthrough articles in the field, and the PIs of the project have been recognized internationally, as evidenced by several international awards and the increasing invitations to deliver keynote lectures in international meetings.

The Lund University Diabetes Centre is certainly one of the top three diabetes research centres in the world. This is due to the logical integration between basic and clinical research and an intelligent structure, leading to groundbreaking findings on different aspects of diabetes pathophysiology. The integration between the research centres in Lund and Uppsala in EXODIAB has had a clear added value, particularly via the biobanks with human islets of Langerhans developed in Uppsala. These two Universities bring complementary expertise, and their successful integration in the context of EXODIAB is a clear plus for diabetes research in Sweden and Europe in general. In short, EXODIAB is fostering research at the top international level, and it is to be expected that novel and very valuable findings will be generated by EXODIAB scientists in the coming years.

Utilization and benefits

The overall grading of utilization and benefits for EXODIAB in an international perspective *has developed with great satisfaction*.

EXODIAB is systematically addressing the unmet needs for diabetes management. They created the EXODIAB Human Tissue Lab, which provides national access to rare human tissues and have access to the unique clinical cohorts ANDIS and ANDIU. Furthermore, they have created a company, Diabridge, with the aim to mature EXODIAB projects with a commercial potential. A total of 12 immaterial property rights have been filed and 1 company founded (Diabridge). Diabridge is designed to mature the EXODIAB projects with commercial potential. The EXODIAB Human tissue lab is in progress to become a biobank of use by academia and industry.

The ANDIUS/ANDIU cohorts are being used to identify the various subgroups of diabetes and enable the development of personalized therapies. EXODIAB has developed an excellent website, providing information to both scientists and laypersons, and are engaging in a positive dialogue with key stakeholders.

The inclusion of innovation management in EXODIAB is allowing very fruitful interactions with potential industrial partners at all levels, from round table discussions to identify unmet needs of common interest to actual collaborative projects. The unit has participated in 267 activities (news articles, radio, TV) by the unit with the public since 2010. The unit has impacted policy in 3 ways: (1) establishing new recommendations for

food intake for diabetes patients, (2) for new Nordic guidelines in prevention of diabetes, and (3) for new procedures for organ donation and transplantation.

There is an important effort by EXODIAB to train MD/PhD students, able to drive forward top quality translational research. There were 11 PhD degrees awarded in 2013, similar to those at the start in 2010. In 2013, the Innovation Office at the Medical Faculty, Lund, created a new PhD course in Innovation, besides developing a very interesting series of seminars on the subject. There has also been a fruitful effort to improve and extend the training of scientists qualified in Bioinformatics, viewed as a key point for the success of the project, plus the development of an educational exchange program with the Broad Institute in Boston and a postgraduate course in diabetology.

Over 50 conferences were held, and it is noted that at least 30 visiting researchers came to the unit; it was also noted that established researchers coming to EXODIAB for sabbaticals.

Collaboration is effective on all dimensions

The overall grading of collaboration for EXODIAB in an international perspective *is effective in all dimensions*.

There is an excellent integration between Lund and Uppsala Universities in the project, which each providing complementary and crucial expertise, for instance in the preparation of human islets of top quality in Uppsala and use of this material for advanced omics studies in Lund. Lund and Uppsala Universities share responsibilities between Boards, with three meetings per year at alternating locations at the universities. Additional phone conferences are held at least monthly. The Human Tissue Lab was prioritized to include more tissues of relevance to diabetes (beyond islets). Clinical cohorts (named ANDIS/ANDIU) recruit new diabetics that are closely followed.

EXODIAB has functioned as a catalyst for new international collaborations, including several EC-funded projects, one IMI project directed by Prof. Leif Groop and the outstanding NIH-funded project TEDDY, led by Prof. Ake Lernmark.

EXODIAB has a clear plan on how to translate their findings via effective collaborations outside academia. This is driven by their newly created Innovation Office and Diabridge, created to mature EXODIAB projects with a commercial potential.

In 2013 there were 4 collaborations with other SRAs, 11 total since 2011 with research institutes. EXODIAB cites working groups with BioCARE, EpiHealth, MultiPark and StemTherapy.

There are 111 reportedly unique collaborations. The largest portion of these are in academia (~50%), up from ~30% in 2011. EXODIAB investments in biological infrastructures such as the Human Tissue lab and ANDIS/ANDIU have resulted in international interest, as exemplified by EXODIAB being approached for new scientific collaborations with EXODIAB members. Further, EU collaborations have yielded new funding, from the British Heart Foundation, Novo Nordisk Foundation and the Eur. Foundation for the Study of Diabetes.

Integration with education

The overall grading of integration with education for EXODIAB in an international perspective has *developed with internationally high standards*.

EXODIAB has a coherent and well-developed educational program, aiming at: 1. Stimulate formation of MDs/PhDs, capable of driving translational research; 2. Develop bioinformatics capabilities; 3. Stimulate innovation and application of research findings. These are important components for the success of the program, and they are been addressed by dedicated courses and series of seminars.

For the 2010–2013 period 47 PhD degrees were awarded. New courses were developed to provide training in Innovation, besides the establishment of an Innovation seminar series as well as an Advanced Study Group in Bioinformatics. Medical students are offered research opportunities in summer with EXODIAB researchers. The existing Master's program in bioinformatics at Lund has been strengthened by EXODIAB to incorporate diabetes in the program. An educational exchange program BLUE ScY builds exchanges with Harvard, Lund and Umea to facilitate learning and student/postdoc mobility.

Management

The overall grading of management of EXODIAB in an international perspective *is moving beyond set goals*.

EXODIAB has an excellent management of the research environment, facilitating integration between research teams and maximum utilization of top resources such as human islets in the tissue biobank. This enables a continuous and logical integration between, for instance, basic research findings in human islets and prospective studies in human cohorts. Of particular interest is the ‘activity groups’ put in place by the LUDC, which allows the rapid concentration of persons and resources on novel and path breaking research.

EXODIAB researchers have successfully garnered funding: 11 EU funded applications are cited, spanning the 2010–2013 timeframe for start dates. Two innovative medicine initiatives (IMI) are listed, joint projects between EU and pharmaceutical industry association. Two ERC grants are cited. Applications are being filed for Horizon 2020. Six additional grants to EXODIAB members are cited, from Novo Nordisk, Wallenberg academy fellowship, etc. In total, 21 awards are mentioned.

The recruitment of scientists to participate in EXODIAB is in line with the best international standards, and is based on international announcement of the positions and a careful evaluation process. Several young and talented scientists have been added to the group. Importantly, EXODIAB has in place a very good program for mentoring young scientists and for the broad training of young PIs, aiming to qualify them for the different aspects of leading a research group. Specifically, EXODIAB carefully and strategically selected young promising scholars at the new instructor or new professor (or more junior) levels as group leaders. Five are recognized as future research leaders now.

EXODIAB is doing a great effort to develop the required basic and clinical research to solve unmet needs in diabetes research. There is a clear interest in translate these findings to meet societal needs, and the rights tools to do this are now in place.

Of note, there was a leadership change, with now Erik Renstrom at the helm, taking over for Leif Groop who remains in the directive board of EXODIAB. There is a 12 member board that meets regularly to assess fiscal and developmental goals of the SRA. A researcher-owned company was formed and the Human Tissue bank developed, along with further accomplishments including joint grants and new collaborations with academia and with industry both nationally an internationally.