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GUEST EDITORIAL:

About neuroscience with Professor Dick F. Swaab

Prof. Dick F. Swaab is former director of the former Netherlands Institute for Brain Research (now Netherlands Institute for Neuroscience) and founder of the Netherlands Brain Bank. He is professor of Neurobiology at the Medical Faculty of University of Amsterdam, mentor of 76 PhD students and author of more than 490 scientific papers in SCI journals and 200 chapters in books. He is editor of 18 books and series editor of the renowned Elsevier Handbook of Clinical Neurology. Within the Elsevier Handbook of Clinical Neurology, he is author of the monograph: **The Hypothalamus. Basic and Clinical Aspects.** Part I: Nuclei of the Hypothalamus (Vol. 79); Part II: Neuropathology of the Hypothalamus and Adjacent Brain Structures (Vol. 80).

The Netherlands Institute for Neuroscience (NIN) is an institute of the Royal Netherlands Academy of Arts and Sciences in Amsterdam, the Netherlands. The institute was established in 1909 as the Central Institute for Brain Research and the first director became Prof. Dr. C.U. Ariëns Kappers. The institute was already from the start internationally oriented and it hosted many foreign guest researchers. Such international orientation still remains one of the unique features of the NIN in the modern era. The NIN has close collaboration with the Academic Medical Centre (AMC), which is the largest hospital in Amsterdam and the medical school of the University of Amsterdam. The very close relationship and collaboration between the AMC and the NIN is also apparent from the fact that NIN has residence in the same campus as the AMC in Amsterdam (*on the picture*). The NIN carries out fun-

damental neuroscientific research with special emphasis on the brain and the visual system. The research is not only aimed at fundamental mechanisms and the development of normal functioning but also on the cause of disorders and the development of diagnostic and therapeutic strategies. The NIN includes 20 research groups with defined areas of interest like Neuropsychiatric Diseases, Neuroregeneration, Sleep and Cognition, Social Brain Lab, Synapse and Network Development, Astrocyte Biology and Neurodegeneration, etc. Included in the NIN is also the **Netherlands Brain Bank (NBB)**, which was founded by Prof. Swaab in 1985. It is a very successful program to collect human brain tissue of donors with variety of



Professor Dick F. Swaab.

neurological and psychiatric disorders as well as non-diseased donors. Received brain tissue (from autopsies) is accompanied by an anonymized summary of patient's medical records. The ultimate goal of the NBB is to advance the understanding of the human brain and to improve the treatment of brain diseases. In 25 years the NBB has done more than 3500 autopsies and has send brain tissues to more than 500 reserch projects in 25 countries.

Nowadays, Prof. Swaab is the team leader of the **research group for neuropsychiatric diseases** in the NIN. The main goal of the group is research of disturbances of hypothalamus, which may develop into neurological, psychiatric or neuroendocrine diseases. The research objectives are determination of the hypothalamic basis of psychiatric, neurological and neuroendocrine disorders; reactivation of metabolically impaired neurons in Alzheimer's patients in order to maintain or restore function and identification of putative factors and targets for therapeutic strategies.

There was a special occasion in the NIN to have an interview with Prof. Swaab about the neuroscience, its future and relations to the clinical practice.

Dick, you became a famous scientist. The main objectives of your research are functional disturbances of the hypothalamus. Could you explain us how you came to the research of the hypothalamus?

Well, I started as a student to work on the hypothalamus. When I started with research as a student, it was a new topic that brain cells are capable of producing hormones and brain cells are sensitive to hormones. So that was the reason I started in that direction as a student. My mentor those days was Prof. Dr. H. Ariëns Kappers and he asked me what topic I am interested in. And I said neuroendocrinology. That is the way I came to the hypothalamus. My thesis was on the supraoptic and paraventricular nucleus of hypothalamus and their possible functions in terms of reproduction. Later I have developed research techniques that could be applied to human material. Since late 70's I started to work on human material in order to study hypothalamic disorders.

What do you think about importance, consequences and development of neuroscience?

The nice thing of the science is you are not only asking questions but that you also look for the answers. And if answer is interesting, other people will check whether it is true. So it is a self-controlling system for progress. And I think science has changed the world.

To me, neuroscience at this moment is really changing high speed because of the technical developments. We can mention the molecular biology and the advanced scanning techniques, that have changed the opinion of many people on the brain. It is interesting to see that also the knowledge of anatomy is now again strongly needed at this moment, to see where molecules are expressed and what circuits are changed in brain disorders. So one need to know into detail the anatomy and the connections between the structures in the brain. That means that what happened 10 years ago, that there was less and less interest in anatomy in neuroscience, has been changed totally again. Now anatomy is coming back for instance in the interpretation of functional scanning results. In general you can say that neuroscience is characterized by multidisciplinary. This is important also for students, they should not only work on their thesis, but they also have to learn how to speak in language of other disciplines. Otherwise they



Academic Medical Centre in Amsterdam.

will not be able to be a part of multidisciplinary research team. One of the problem in neuroscience at the moment is that a lot of neurobiologists do not know enough about diseases of the brain. On the other hand, clinicians who know a lot about brain diseases, do not know enough about the complex research techniques and their limitations. So, there is the bridge that has to be reinforced between the research and the clinics. And it is also very important that people who were trained in medicine are doing, for instance their PhD in a research lab, so they can bridge the gap between two fields. In addition, I think that it is also crucial that neurobiologists can get more information about brain diseases.

And what about the future of neuroscience?

I think we can expect that neuroscience will penetrate into society. The consequences of neuroscience are now becoming clear for many things in society. For instance in law. If you walk around in the prison, you can see that the far majority of young people there have psychiatric problems. And the question comes up, whether prison is the right place for psychiatric patients. Moreover, we know that during puberty the whole brain is starting to function in different way. And many young people in puberty are doing things that are not allowed. The question is, should they be punished by prison where they are coming into contact with professional criminals learn about criminality in a professional way? This is really detrimental for the rest of life. The idea that brain is not mature until the age of 24 is also important for criminal law. The adult law, which is starting at age 18 should be moved up to age of 24. The politicians are, without any knowledge of neurobiology, now trying to bring the age for adult law down to 16 years of age! Now we know how complex and vulnerable brain development is, it is not surprising at all that it goes wrong let say in 15 % of cases. This may lead to mental retardation and psychiatric problems. It can happen in every family, and to everybody, just by bad luck. So we should take care of these people as a society. However, we currently live in a selfish atmosphere where people are usually not interested in those with bad luck anyhow. Neuroscience has also penetrated into philosophy. Philosophy is traditionally taking care of thinking about the mind and free will. Neuroscience is now penetrating also into this field and giving totally answers by experiments. Moreover, it is also important that programming of the brain is better understood now. This means that some programs are inborn and they can not be changed. This fact is for instance very important in the way how we look at transsexuality, homosexuality or paedophilia in society, law and also in medicine. It is well accepted that brain in transsexuals has changed in a permanent way, so we should adapt the body and not to try to change their behavior. Also in homosexuality, there are permanent changes in the brain and it doesn't make any sense to try to change homosexual man to heterosexual man. Because it was programmed in the brain before the birth and you cannot change such programs. And the same problem holds now also for paedophilia. One should not try to change the sexual preference of paedophiles, one should

try to learn them to deal with impulses. So we have many, many things which are better understood by knowledge of neuroscience and we have to deal with it in society.

In the clinical practice, we have also a new specialization neuropsychiatry which is aimed at the diagnostics and treatment of psychiatric and behavioral disturbances mainly in the area of „border“ between neurology and psychiatry. What do you think about this idea?

We see indeed rapid progress of knowledge in overlapping areas of both disciplines. Neurological disorders have many psychiatric features and psychiatric disorders have a neurological basis. The clear distinction between neurology and psychiatry is disappearing. Now we know that we can find not only functional, but also structural changes in both neurological and psychiatric disorders. It only depends on the quality and sensitivity of the techniques to identify structural abnormalities in the central nervous system in psychiatric disorders. I think that in the future there will be different subspecializations in this field. And it is a good idea to develop this field further for clinical practice. In disorders like Parkinson's disease, it is very important to treat behavioral disturbances, which improves the quality of life in patients, since the basic process of the disease can not yet be treated. The future will learn where the borders of these subspecializations are. Also the border between psychiatry and psychology is a rapidly developing fruitful area.

Activitas Nervosa Superior Rediviva is the International Journal for Integrated Neurosciences. What is your message for readers?

We are living in a period with a tremendous activity in neuroscience, which rapidly penetrates in both, clinics and society. We are living in a period, when it is impossible to follow all the progress in neurosciences. There should be journals that tell what the main lines of research are, and what is the progress of these lines. Individuals can not follow all the neuroscientific publications. So there should be the journal digesting the progress and telling the readers in simple ways about the complex field of neurosciences.

Thank you very much for the interview.

The author of this article worked as a guest researcher in the laboratory of Prof. Swaab, Research group for Neuropsychiatric Diseases, the Netherlands Institute for Neuroscience, Amsterdam.

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