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Endocrinology – quo vadis?

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In 1849, *Adolph Arnold Berthold*, both medical doctor and zoologist working at the University of Göttingen, Germany, removed the testicles from male chicken. After castration they did not develop to roosters. When he re-implantated the testes, the chicken developed to normal cocks (Figure 1) with characteristic cockscomb and big tail feathers. Berthold can thus be regarded as a pioneer of modern endocrinology. Before his fundamental experiment, endocrine disorders were thoroughly observed and described in detail only. Also the fathers of modern diabetology, in many countries like Russia or Switzerland still an integrated subdiscipline of endocrinology, worked within the German borders, which included Breslau/Wroclaw and Strassburg/Strasbourg at that time: *Paul Langerhans*, *Josef von Mering* and *Oskar Minkowski* (Figure 2). *Artur Biedl* wrote the classical first comprehensive textbook on endocrinology in 1910 in German language ("*Innere Sekretion*", part I and II, three editions until 1916, Figure 3), and the first scientific journal devoted exclusively to endocrinology appeared in 1928 named "*Endokrinologie*". It still exists, with the new name in English "Experimental and Clinical Endocrinology & Diabetes", the author being its "Honorary Editor-in-Chief. Therefore, Germany may be named the "cradle of endocrinology" [1].

Endocrine societies are interdisciplinary. Their members, e.g. those of the German Endocrine Society (founded 1953) comprise internists, pediatricians, gynecologists, specialists in nuclear medicine, urologists, surgeons, neurosurgeons, psychiatrists, preclinical specialists, molecular biologists, nutritionists, veterinarians, molecular biologists, zoologists, comparative endocrinologist, geneticists, and others.

However, most of the members of endocrine societies are internists.

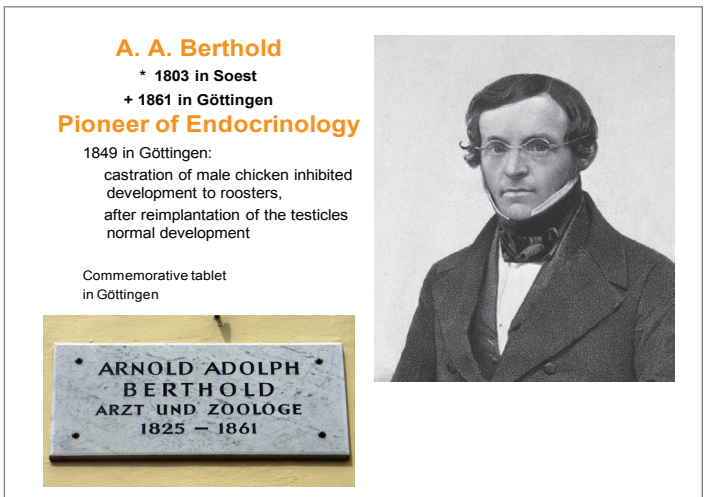

Figure 1: Arnold Adolph Berthold, pioneer of endocrinology (Composed by the author with free accessible material)

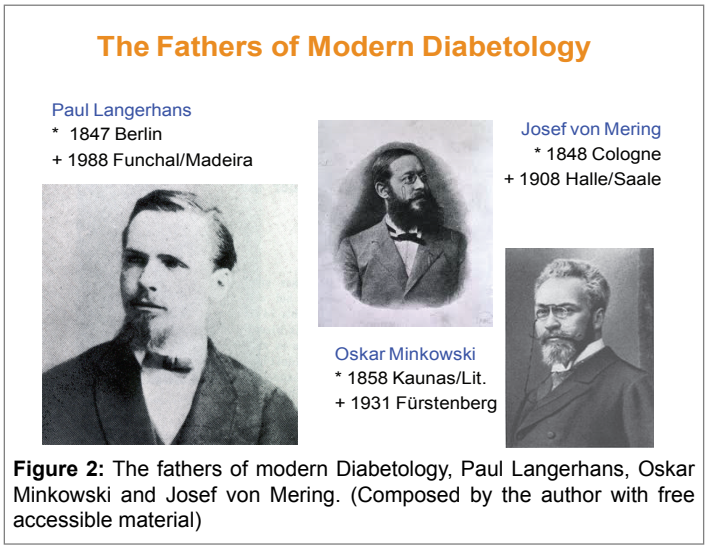

Figure 2: The fathers of modern Diabetology, Paul Langerhans, Oskar Minkowski and Josef von Mering. (Composed by the author with free accessible material)

Clinical Endocrinology flourished and big progress was made in diagnosis and treatment of endocrine disorders in the last decades. A constantly increasing number of endocrine disorders can be explained on a molecular basis now, and detection of mutations in biopsies or tissue probes are already used for classification and personalized therapy, e. g. in thyroid cancer, or in pituitary adenomas.

In the general population, however, the expression "endocrinology" is largely unknown, in contrast to e.g. cardiology, gastroenterology or oncology.

For clinical endocrinology two major problems are existing nowadays:

1.) The situation in the practise: In many countries including Germany every doctor can get the results of hormonal determinations of his patients from laboratories today. The laboratories have taken away the "instruments" developed by us, especially the immunoassays. So it is financially not easy for many endocrinologists to exist without getting honoraria for endocrine determinations which they have to interpret. This is far more than printing a "plus" or "minus" sign by the laboratory computer when a value lies outside the "normal range" (which is, as a matter of fact, a "reference range" meaning that 5% outside can also be "normal"). Instead of the practising endocrinologist, big laboratories are now getting the money from the insurance companies or the patients directly in most of the cases. As a consequence, many practising endocrinologists in Germany have already abandoned their office and became employees of such laboratories with a fixed salary.

2.) The situation in hospitals: Endocrinology is a mostly out-patient discipline. In many countries the number of doctors of departments is still

The first comprehensive and critical textbook about Endocrinology by A. Biedl
1st edition: 1910

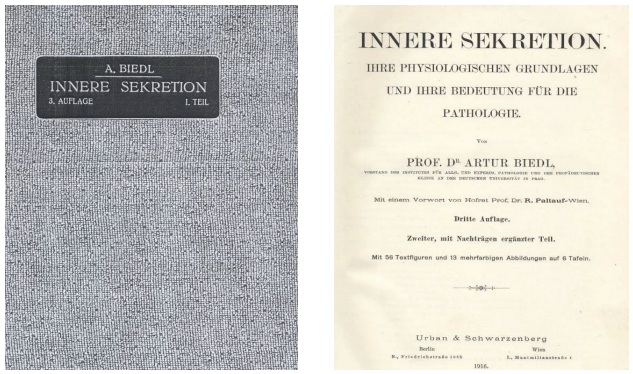

Figure 3: The first Textbook of Endocrinology 1910 by Artur Biedl (Photograph by H.S. of the author´s copy of the 3rd Edition 1916)

calculated based on the number of allocated beds for treating in-patients. The endocrine departments are thus shrinking which becomes a big problem especially at university clinics. Therefore, it appears absolutely necessary that endocrinology and diabetology stay together and do not separate: Endocrinology has a big number of clinical pictures which are often very complex and demanding, with a scientifically highly interesting background. But they can be diagnosed and treated mostly as out-patients. Diabetology, on the other hand, needs more beds for patients which have to be hospitalized. Hospitals are often not licensed to treat out-patients. This results in too small numbers of jobs for young doctors wanting to become endocrinologists at universities. It is thus difficult to educate and train sufficient endocrinologists. The situation may certainly vary between different countries with varying health care systems.

The knowledge in the field of endocrinology is growing dramatically. Hundreds of hormonal substances, cytokins and other mediator substances have been and will be detected. Can, and shall all these new principles be integrated in a clinical speciality "endocrinology"? And what happens with the interaction of the microbiome and the virome with the endocrine system and metabolism? And with the topics of lifestyle- and anti-aging hormones as well as with hormonal doping control?

The situation appears for me very similar to the speciality "Clinical Immunology". Such a discipline has been established in the 1970 ties, and it has resulted in "Departments of Clinical Immunology" at some university clinics. However, these departments disappeared after short time because patients e.g. with rheumatoid arthritis and asthma went on to consult rheumatologists and pneumologists, respectively, and not such new "clinical immunologists". Although the Angiotensin-Receptor-Neprilysin-Inhibitor (ARNI) is based on two endocrine mechanism patients with heart failure will not go to an endocrinologist but to a cardiologist [2]. The same holds true for myopia: Dopamin production in the retina protecting the eyeball from elongation is diminished when not enough bright day light is reaching the eye in children and adolescents, obviously leading to myopia. Short-sighted patients, however will, of course, visit ophthalmologists and not endocrinologists [3].

Therefore, I do not agree with the view of the president of the German Association for Internal Medicine 2015, Michael Hallek from the University of Cologne: In his Presidential Address at the 121. Congress of the "Deutsche Gesellschaft für Innere Medizin" in Mannheim on 19 April 2015 he predicted an end of the classical disciplines of internal medicine, like gastroenterology, endocrinology, oncology and so on , in favour of units newly to be established based more on the underlying mechanisms of diseases, e.g. molecular biology. I am completely sure that patients with classical endocrine disorders will continue to visit clinical endocrinologists for diagnosis and treatment. The endocrinologists have to use the results of the new techniques like genome analyses or molecular biology. Apart from clinical questions, the wide field of known hormonal substances which may well exceed thousand in the future remains a wide field open for the many specialists which are now members of endocrine societies. Endocrinology will remain an integrative discipline.

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