Neurology of the future: Constants in a changing world

World Congress of Neurology
Santiago, Chile
2015

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Conflict of interests

I declare that I have conducted clinical trials and spoken at conferences or served as a consultant to the pharmaceutical industry (Apsen, Bayer, Bristol-Myers-Squibb, Janssen-Cilag, Moksha8, Novartis, Roche and Wyeth) and received financial support to participate in medical congresses and events

Neurology of the future: Constants in a changing world

Objective

- To identify what is going to be constant in Neurology in the near future

Neurology of the future: Constants in a changing world

Summary

- Limitations
- Previous attempts to predict the future of Neurology (as well as constants)
- Importance of Neurology (and of neurologists)
- Diagnosis
  - History taking
  - Neurological examination
- Neurology: one or several specialties?

The future of Neurology Limitations

"The only safe prediction about stroke in the next three decades is that it will be very different."

"Progress largely depends on discovery, and discovery cannot be predicted."

"However, understanding from where we are coming may help guide where we are going."

Hachinski V, Stroke: The Next 30 Years Stroke 2002)

Several authors endeavored to predict the future of Neurology

- Brain R. Neurology: past, present, and future. British Medical Journal, 1958
- Bailey P. The past, present and future of neurology in the United States. Neurology, 1951
- Walshe FM. The present and future of neurology. Arch Neurol, 1960
- Engstrom J. W., Hauser J. L. Future role of neurologists. West J Med, 1994
- Bradley WG. Neurology in the next two decades: report of the Workforce TaskForce of the American Academy of Neurology. Neurology, 2000
- Freeman W. D., Vatz K. A. The future of neurology. Neurol Clin, 2010
- Biller J, Schneck MJ. The future of neurology. Frontiers in Neurology, 2011

Attempts to predict the future of Neurology from 1950 to 1970

- The impact of information technology, neuroimaging techniques and genetics on Neurology could not be predicted by them
- In this sense, they were much more conservative than we are now when thinking on the near future

Neurology of the future: Constants in a changing world

- My task is to try to have the opposite perspective: what is not going to change in Neurology in the near future

The rising importance of Neurology (and of Neurologists)

- Primary physician in neurological diseases
- Consultant physician
- Office neurologist (outpatient clinics)
- Hospital neurologist (including intensive care units)

Reasons for the continuing growing of importance of Neurology (and of Neurologists)

- Increased knowledge on Neurosciences
- More available treatments for neurological diseases
- Aging of the populations

General Principles of Neurologic Localization

Clinical diagnosis in Neurology requires several steps:

1. Recognition of impaired function
2. Identification of which site or sites of the nervous system has/have been affected (localization)
3. Definition of the most likely etiology (differential diagnosis list)
4. Use of ancillary procedures to determine which is the etiology in the patient

Brazis, Masdeu, Biller. Localization in Clinical Neurology, 2011

Constant in a changing world

- The topographic anatomo-clinical method, a two-part methodology that linked clinical signs with anatomical lesions.
- This method has been empowered in the last decades with new neuroimaging techniques.

Constant in a changing world

- This same method will continue to provide more information on normal and abnormal functions of the nervous system
- Neuroanatomy of course is constant, but our knowledge on neuroanatomy is going to increase, particularly about the connections and circuits of the brain (connectoma).
- The topographic anatomo-clinical method will be even more important

History taking (Anamnesis)

"Different from all other medical specialties, save perhaps psychiatry, the neurologist is heavily dependent on listening to and interpreting what the patient tells us… If you don't know what is happening by the time you get to the feet you are in real trouble."

Jerome M Posner, 2013 (quoted by Nichol & Appleton , 2015)

History taking (Anamnesis)

- History taking is an art
- History taking is crucial to establishing a diagnosis
- Examination alone only led to a diagnosis in 1% of patients admitted to the emergency department of general medicine (Paley et al., 2011)
- The examination helped establish the diagnosis in 28.5% of cases, though the examination findings were misleading in 10% of the cases (Simpson, 1977)

Nicholl & Appleton, 2015

History-taking: Constant in the near future

- Safe
- Low cost
- Less time-consuming

- Individualize ⇄ generalize
- To treat the patient and not only the disease
- To avoid VOMIT (Hayward R. VOMIT - victims of modern imaging technology—an acronym for our times. BMJ 2001)

Neurological examination

- Did advances in modern diagnostic techniques have rendered some of the neurological examination obsolete?

McNeill, Practical Neurology 2005

Two editions of *Hutchison's Clinical Methods*, 1897 vs. 2002

Physical examination	Neurological examination	Respiratory System	Cardiovascular System
1897 Edition	19 110 words	10 000 words	20 330 words
2002 Edition	29 632 words	5 310 words	6 010 words

Investigative Techniques	Neurology	Respiratory System	Cardiovascular System
1897 Edition	1 850 words*	-	-
2002 Edition	2 300 words**	3 680 words	10 000 words

* Electrical examination of muscles and nerves

** Mostly neuroimaging section

McNeill, Practical Neurology 2005

Neurological Examination

- There are at least 94 different elements in the NE.
- But experienced neurologists perform an adequate NE in a few minutes
- They have learned what is useful and what is not (the neurologic examination as a heuristic strategy)

Is neurological examination so important?

- The reasons for the apparent continuous increase of physical examination in clinical neurology, as compared with other specialties, are a matter of debate.
  - ✓ cost and complexity of neuroimaging techniques (?)
  - ✓ "much of the expansion of the neurological examination is due to the acceptance of new examination techniques and signs with little critical appraisal of their clinical utility"
  - ✓ In future, application of clinical research to select the most useful examination techniques, and so create an "Evidence Based Neurological Examination"

McNeill, Practical Neurology 2005

One Neurology in the near future?

- Child Neurology
- Epilepsy
- Cognitive and Behavioral Neurology
- Vascular Neurology
- General Neurology
- Clinical Neurophysiology
- Movement disorders
- Neuroradiology
- Sleep Medicine
- Neuromuscular Neurology
- Pain
- Critical Care Neurology
- Rehabilitation Neurology

An old issue

- “In the future, as has always been the case in the past, some neurologists will be particularly interested in those aspects of neurology which are relatively remote from psychiatry. Others will find their chief interest in those neurological disorders in which the psychiatric aspect is prominent.”

Russell Brain, 1958

Is Neurology going to divide into several specialties?

- Now there are more subareas of Neurology, and there will be more in the near future.
- Will Neurology remain a single specialty or will be divided into several specialties?

Conclusions

- Neurology will continue to be a important medical specialty
- General principles of neurologic localization are not going to change
- History taking will continue to be crucial for diagnosis in Neurology
- Neurological examination is going to be reduced to an essential examination
- Neurology will continue to be a single specialty *(maybe a wishful thinking)*

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