



NACHSTEHENDE BESPRECHUNG IST ERSCHIENEN IN:

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Nowinski, W. L., Bryan, R. N., Raghaven, R.: The electronic clinical brain atlas: multiplanar navigation of the human brain. New York, Stuttgart: Thieme 1998. PC/Mac CD-ROM (ISBN 0-86577-671-7, ISBN 3-13-107661-5).

This *Electronic Clinical Brain Atlas*, by Thieme Medical Publishers, constitutes a first attempt to create a clear and easy-to-consult electronic medium designed to represent the basic functional and radiologic anatomy of the central nervous system and addressed to all practitioners working in the neurological sciences. CD-ROM browsing opens with an introduction by Jean Talairach and proceeds with an accurate description of the image sources included in the work. Particular attention is paid to the history and development of stereotactic atlases, to the principles of their clinical applications, and to future perspectives.

The CD-ROM hosts two different atlases, the Talairach-Tourneaux and the Schaltenbrand-Wahren atlases. The first of them is made up of four sources combined:

1. The TT88 (Talairach-Tourneaux 1988 edition, original title: *Co-planar Stereotaxic Atlas of the Human Brain*)
2. The TT93 (1993 edition, original title: *Referentially Oriented Cerebral MRI Anatomy*)
3. The TTBG (including a complete representation of Brodmann gyri)
4. The MRI TT88 (comprising magnetic resonance images in axial, sagittal and coronal planes)

The Schaltenbrand-Wahren atlas (SW) contains stereotactic images digitalized in gray scale, taken in axial (20 sections), sagittal (34 sections) and coronal (20 sections) planes.

On launching the application program from the Windows menu with a single mouse click (in Windows 95 O. S. it is possible to access and use the Brain 95 file directly, whereas installation is required with Windows 3x O. S.), the user will be able to choose between two different navigation environments, the "multiplanar" and the "triplanar" atlases. Before approaching either of the two sections it would be preferable to get an idea of the large number of functions displayed on the screen by carefully reading the index and the online help.

A second important choice will now be the selection of one of the three modalities of consultation indicated at the upper right of the working area:

1. Labels off
2. Labels on
3. Register

Child's Nervous Systems

In fact, from this point onward, every subsequent choice will implement a group of specific functions. In the Labels off mode, the user will not be able to consult the anatomical index for structures visualized in the main and secondary windows; this function will instead be activated in the Labels on mode. This last modality also offers the option of centering attention on a specific cerebral region or functional anatomical pathway, which is done by clicking on the full or abbreviated name of a particular anatomical structure. In both modes the user will be able to make a zoom of what is observed and to pick up region coordinates; moreover, the options menu will give him/her the possibility of going back to the home page, setting the preferences and printing images or textual descriptions (function available only in 256 color mode display selection). The preferences menu is characterized by the possibility of determining what is visualized in the main window and what in the reference 1 and reference 2 windows, the orientation the user prefers (only in the multiplanar atlas), and the font used for text and its dimensions.

Moreover, in the Labels on mode, the user can activate the Search key (bottom left of screen) to find a specific region of interest in the images shown. Finally, the Flip key (on the same side as the Search key) will make it possible to move a selected image in the main window anywhere the user wishes.

The Register mode deserves particular attention, being probably the most attractive function included in the CD-ROM. After taking an image in any space axis, the user can select part or all of the image and assign measurements for a new width and height, resizing the selected section; it is also possible to save the new image directly to the user's own hard disk.

In Labels on, Labels off and Register modes, the Go to menu is necessary to choose a specific slice while skipping all the interposed sequence.

Multiplanar and triplanar sections only differ in the spatial representation of anatomical elements: with multiplanar sections the user is able to define desired combinations of the Talairach-Tourneaux and Schaltenbrand-Wahren atlases in only one plane; in the triplanar section corresponding axial, coronal and sagittal views are always supplied.

The Frame advance key, at the upper right of the working area, turns out to be extremely useful for the user when a rapid and exhaustive search method is needed, making it possible to know more of the sequential appearance of anatomical regions and structures and their boundaries in the three spatial planes in succession.

The Grid key (lower left of the screen), finally, creates a coordinates grid over the displayed image, a function that is sure to be appreciated by neurological surgeons involved in stereotactic surgery.

The CD-ROM also includes a short video clip showing a series of three-dimensional digitalized images; unfortunately, though highly defined, and though it would be possible to stop and observe a specific region, this is only a limited preview of a future three-dimensional atlas.

On the basis of the characteristics we have described in detail, we confirm that this CD-ROM certainly fulfills user expectations, in spite of some obvious limitations related to being the first product of this type to treat such a complex subject as human brain anatomy, which is still an evolving field of knowledge.

The first impression a user has of this CD-ROM is particularly pleasing because of the extreme ease of use. Consultation is quick and the reference menu particularly intuitive, even for people who feel anything but confident with electronic media. The possibility of modifying images and saving a selection to one's own personal computer is an extremely valuable element of the electronic atlas, which gives the user the option of keeping topics of interest in a quickly utilizable folder on his or her own desktop.

Printing of an entire image or of a selected area results in well-defined tables, especially in the case of TT88 and TT93 and for SW images.

Furthermore, the possibility of following neural pathways along their natural course in every plane is of great interest: the labeling menu could be extremely useful for nonskilled persons in neurological sciences departments, in view of its capacity for giving a more than accurate idea of the natural succession of cerebral structures.

The quality of digital images is quite good, though the scant number of colors indicated as optimal (256 mode) and the small size of most pictures result in a low-level rendering. The zoom key, which allows the user to augment resolution by almost 50%, never enlarges the selection without producing a scaling effect, with a consequent loss of definition. In contrast, high resolution is preserved when the zoom function applied to the Schaltenbrand-Wahren atlas images is used: they are magnified without deterioration of contours or worsening of the original brightness. Furthermore, magnetic resonance pictures appear to be the more subject to worsening after resizing.

There are fewer images than might be expected; however, the authors seem to

have decided on this deliberately, being concerned to create a clear boundary between the various digital sections and make it possible to have a near-perfect correspondence between radiological and stereotactic images in all cases.

In conclusion, we see this electronic clinical brain atlas as a significant first step in the digitalization of medical sources, tending in the same direction as international projects such as the Visible Human Database. Compared with other electronic documents, this CD-ROM has the great advantage of easy consultation, which should favor its distribution and wide use. Furthermore, it can be regarded as an introduction to the coming three-dimensional atlas of the human brain, which it anticipates as a video clip. In more general terms, this work could be considered a stimulus to future enjoyment of exciting representations of the anatomy of human nervous structures.