2. Videoclips

If you experience problems viewing the videoclips or are interested in more details, please see ⇨ **Video Formats and Troubleshooting**.

Please bear in mind that the speed of your CD-ROM drive is the limiting factor when starting a clip. It may take several seconds before the animation starts.

2.1 Normal resting brain glucose metabolism

Show Video
VideoClips/Normal-FDG.mpg (.avi)

This videoclip demonstrates the uptake of FDG in the brain of a normal volunteer studied with a high-resolution PET scanner (HRRT, CTI, Knoxville, TE) under resting conditions (eyes closed, ears unplugged). The FDG PET was co-registered with a T1-weighted MRI of the same individual.

The videoclip starts with a rendering of the brain surface based on the MRI and proceeds to move with transaxial PET-MRI fusion images from the vertex to the level of the thalamus. Other normal FDG data are show in fig. 3.1 in the book and in the normal FDG data set on this CD-ROM, which represent the average from 12 normal volunteers.

2.2 Functional impairment of cortex in Alzheimer disease (AD)

Show Video
VideoClips/Alzheimer-Cortex.mpg (.avi)

This videoclip is based on the FDG PET of a patient with AD of moderate severity. As in fig. 2.1 of the book, the difference between his glucose metabolism and normal brain glucose metabolism is shown using a "hot body" color scale. It displays regions with a severely impaired glucose metabolism in bright orange and yellow colors and those with mild impairment in red color. The data have been spatially normalized and co-registered with a T1-weighted MRI that is the basis of brain surface rendering. At the surface, underlying metabolic abnormalities (within cortical sheet of 6 mm thickness) are displayed in fusion color code.

The clip starts with a right lateral view of the brain, explaining the display mode at a major metabolic abnormality in temporoparietal cortex. It then looks at the parietal vertex of the brain, where the central sulcus and primary sensorimotor cortex with quite normal metabolism (dark color) are easily recognized. We then move to a posterior view with relatively normal metabolism in occipital cortex. Then we turn to a right lateral view with impaired glucose metabolism in the angular gyrus and other parts of temporo-parietal association cortex. Finally we start cutting through the brain in the sagittal plane, ending with exposure of impaired metabolism in the precuneus and posterior cingulate at the midline.

2.3 FDG PET in Alzheimer disease (AD)

Show Video
VideoClips/Alzheimer-Patient.mpg (.avi)

In this videoclip we move through the FDG volume data and co-registered T1-weighted MRI of a patient with mild AD (MMSE score 23). During this journey we stop at the locations that provide the key diagnostic clues. At these locations the transaxial FDG PET of the patient (left) is compared with the MRI (presented as a fusion image in the middle) and with the normal reference FDG (right, average from 12 age-matched normal subjects). We move between these locations on the standard VINCI display of three orthogonal cuts through the FDG PET with the current location of the cuts marked by crosshairs. You can also explore the complete volume patient data using VINCI, the software provided on the CD-ROM. Please see section 3.2 *Volume Data* of the HTML documentation.

2.4 Preoperative localization of eloquent cortex and tumor extent

Show Video
VideoClips/Glioma.mpg (.avi)

This videoclip demonstrates the possibilities that PET offers for preoperative localization of eloquent cortex and tumor extent in patients with brain tumors. Using the familiar display mode with three orthogonal cuts, we start at the contrast-enhancing center of this recurrent glioma, which also has large cystic parts (also shown in the book as fig. 2.30). By fusion with the co-registered ^{11}C-methionine PET we show that most of the metabolically active tumor (including the active infiltration zone) is localized more laterally, close to the brain surface. We then move to the language area in superior temporal gyrus that showed increase of blood flow in a ^{15}O-water PET study during language activation. By image fusion, we compare its location with the extent of the metabolically active tumor, which is immediately adjacent but does not overlap, sug-

gesting that tumor resection is possible. We then move to the hand area of primary motor cortex, which was localized by ^{15}O-water PET by a significant increase of blood flow during finger tapping. Relative to the contralateral side, motor cortex has been shifted by the tumor mass effect somewhat rostrally. We also see, as usual, the activation of the supplementary motor cortex close to the midline. By fusion with ^{11}C-methionine PET, we then see that there is a safe distance between motor cortex and metabolically active tumor. At the end we go back to the center of the metabolically active tumor and compare it with the language activation data.

The complete volume data of this patient are also available on this CD-ROM for interactive exploration by VINCI (see section 3.3 *Volume Data* of the HTML documentation).

2.5 The effects of thrombolysis in cerebral ischemia

Show Video
VideoClips/Ischemia-and-Thrombolysis.mpg (.avi)

This videoclip presents 3 consecutive 15O-water CBF studies in a patient with acute cerebral ischemia in the right middle cerebral artery (MCA) territory (see also fig. 2.36 in the book). The first study was done within 3 hours after onset of symptoms (hemiparesis) at the begin of thrombolysis (by intravenous recombinant tissue plasminogen activator), showing severe ischemia in most of the MCA territory and some hyperperfusion at its anterior border. The second study was done during thrombolysis, showing partial restitution of CBF. In the last study, several hours after the end of thrombolysis, restitution of CBF is complete, now with some postischemic hyperperfusion. A control MRI 3 weeks after the incident demonstrates the structural integrity of the brain, corresponding to complete clinical recovery.

2.6 Remote effects of cerebral ischemia

Show Video
VideoClips/Remote-Effects.mpg (.avi)

In this videoclip the remote effects (diaschisis) of ischemia are demonstrated in the same patient as above. We move from the ischemic core to ipsilateral thalamus and contralateral cerebellum, which are functionally deactivated during acute ischemia. With restitution of CBF these remote effects also disappear, which is demonstrated for contralateral cerebellar diaschisis.

2.7 Video Formats and Troubleshooting

Using the links above should open the respective videoclip in your system's standard player (e.g. Windows Media Player on MS Windows). However, your player's settings might not be suitable for the type of videclip provided on this CD-ROM: unproportional scaling has a huge impact on image quality. Using the pdf version (which requires a suitable viewer like Adobe Acrobat Reader 6, a ready-to-run-version of which is provided on the CD-ROM for MS Windows) you can make sure that all videoclips are displayed correctly.

If you are not running MS Windows, we recommend using the MPEG-1 versions (*.mpg) of the videoclips which can be viewed on a wide range of platforms with a number of viewers (e.g. xanim and xine on popular UNIX platforms like *Linux* and *Solaris*). Mozilla, a popular HTML-browser for Linux/Unix and Windows should be able to play the videoclips immediately.

The recommendable QuickTime viewer also handles MPEG-1 format (File-menu: open as MPEG). It is freely available from Apple Inc. (http://www.apple.com/quicktime/products/qt/) for several Apple Macintosh systems and MS Windows.

The AVI format is a container format for a plethora of possible compression options. We have used MPEG-4 compression settings, a comparatively new and advanced scheme, for the AVI files. The AVI-videoclips we provide on this CD-ROM should run on all more recent *MS Windows* systems.

Tip: if the videoclips do not start when you click on the links, try starting them directly from the VideoClips directory of the CD-ROM.