Most significant news in the last versions of the IM512P

(Ordered from most recent version to older ones)

2015.11.21: V3.5

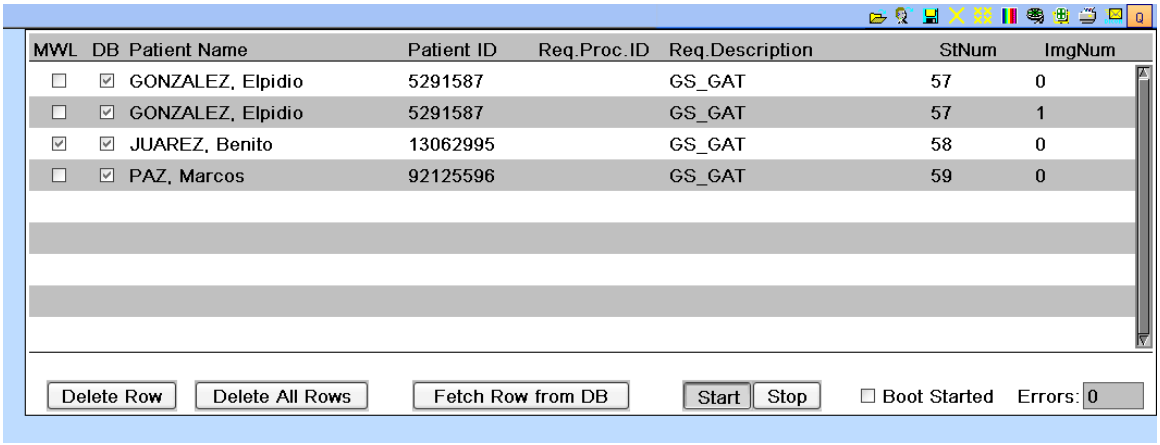
► **Graphics changed** to support 16 bit characters and up to 65535 characters (instead of 255). Compatible with old fonts. Unicode fonts that support Chinese, Japanese and Korean.

► **Interfile:**

- If modality reads '*nucmed*' in an imported study, it becomes NM instead of being blank.
- The '*exam type*' attribute of an imported study is used as study type of the IM512P (mandatory field). If it was blank, the value is taken from '*study ID*' of the Interfile study (except in some particular cases from GE).

► Connection as a workstation (processing only) for **ADAC Pegasys computers:**

- **Networked with Pegasys:** studies are acquired as usual with the ADAC system. The IM512P periodically explores the Pegasys data base to look for new acquisitions, imports the new files and incorporates them into its own data base without operator action. The screen displays a collapsible list as the studies arrive. Up to 4 independent cameras can be explored.
- It may be used with **Modality Worklist** (MWL): the IM512P receives information from the MWL server and keeps it waiting till matching studies (patient name and ID) are retrieved from Pegasys. When a matching study comes, all information coming from MWL is attached to it and saved. If the study is then sent to a PACS, all the attributes received from MWL are sent too.



- Manually (if no Pegasys is networked to the IM512P) you can copy studies from Pegasys computer to an IM512P folder that is explored periodically. New studies found in this folder are imported and incorporated into the IM512P data base. This may be combined also with MWL if the IM512P is networked with a MWL server.
- In all cases a transaction log is created in a text file, with configurable levels of information.

► The same manual method just described may be used to import DICOM or Sopha/SMV DS7 format, or studies coming from another IM512P, and incorporate them automatically into the local IM512P data base (any format that can be read with **Study-Open**).

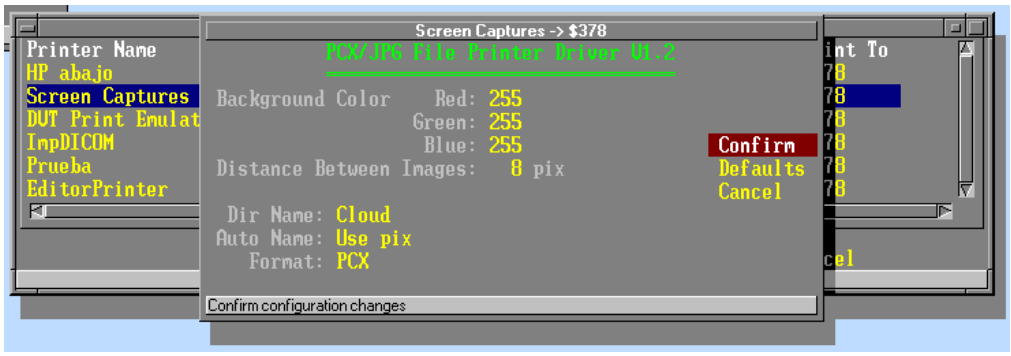
► Digitally signed **64 bit drivers** for ADQUSB and INTEGUSB boards to be used with 64 bit Windows 7/8/10.

► **CardiacSPECT:** a verification check box was added to SendStudy configuration. If checked, confirmation is required before sending, printing or saving each screen.

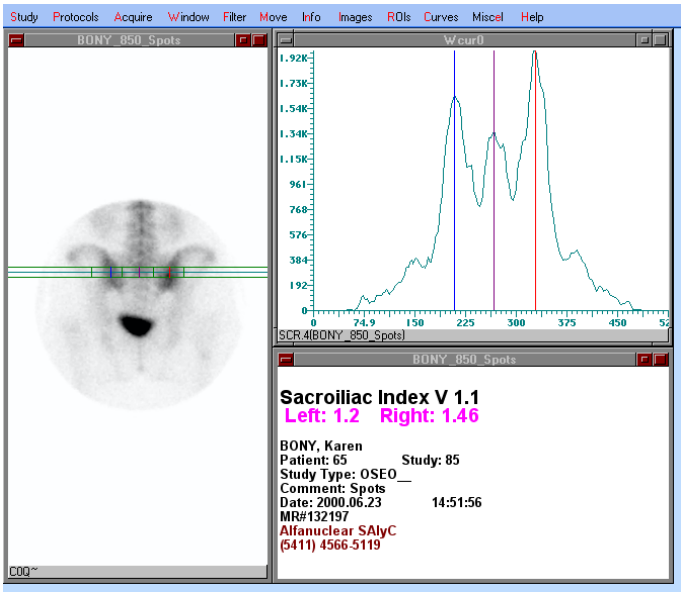
► **Screen rotation** for most recent PCs, tablets and laptops with Windows 10.

► All **clinical protocols** go automatically to the data base if no study is in memory. Most of them use new fonts.

► **PCX printer**, that creates PCX or JPEG files, can now store the image files in the cloud (OneDrive, DropBox or GoogleDrive) to see them with any connected device.



► **Sacroiliac Index:** new protocol to calculate the ratio between maximal counts in sacrum and sacroiliac joints, from a variable width profile drawn on a bone scan (whole body or spots).



► The **mouse wheel** now allows vertical scrolling in image windows, in the study list of Acq2 and in the internal text editor. Besides, if used while Ctrl key is kept pressed, it allows to enlarge or decrease the contents of an image window without modifying the borders (as when using gray + or -).

► IM512P screen's **width and height** may be configured with environment variables to better manage the numerous screen resolutions of modern devices. For instance: IM512 may be set to 1024x768 in a monitor with 1920x1080 resolution.

► In **Windows 10** with very large resolutions (like 3200x1800) **text size** may be enlarged for legibility.

► **Whole body acquisitions:** now you can acquire in the opposite direction and starting from feet.

► **GenSPECT** and **GenReview:** new protocols added. They are similar to **CardiacSPECT** and **CardiacReview** but aimed to non-cardiac tomographic studies.

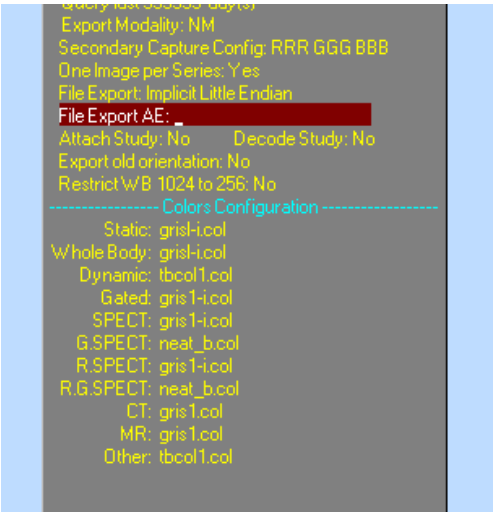
2013.05.25: V3.4 (beta)

► **Data base:** study table indexed by date to speed ordering by descending date in server-client systems with slow networks.

► **Study-Open** allows to read ADAC Pegasys studies.

► **DICOM:**

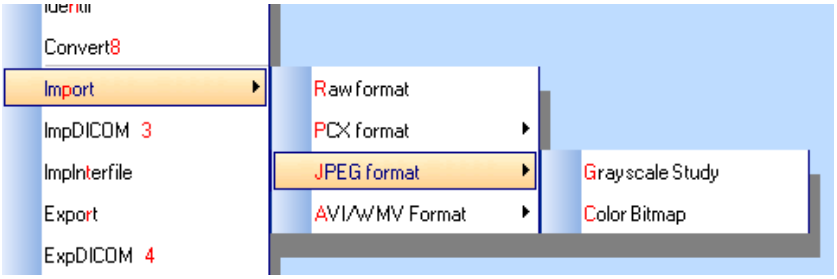
- When exporting **whole body** studies acquired in 1024x1024 matrices to servers or physical media, **width can be restricted** to 256 while height stays in 1024 (compatibility for UltraSPECT Xact.Bone).
- Configurable **color tables** according to acquisition type (static, dynamic, SPECT, etc.) and modality (CT, MR, Other) for DICOM objects imported from files or received through a network.
- Configurable **Source Application Entity Title** (0002,0016) when exporting DICOM objects.



► **Upgrade for Elscint Apex cameras** with 37 or 95 PMT, with acquisition board INTEGUSB (this board also allows to acquire from Starcam/XCT/XRT cameras without frontend boards) and INTDAC of 120 channels. Whole body acquisition is available.

► Up to 3 gamma cameras **simultaneous acquisition**. Two or three heads acquisition for some gamma camera brands.

► **JPEG images** may be imported as color bitmaps or converted to gray scale (counts) to be processed as studies.



► **Uniformity:**

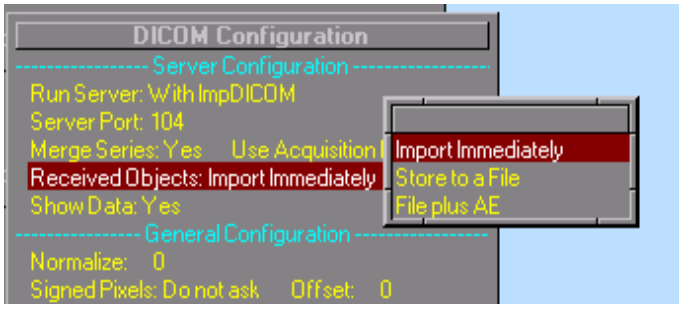
- **Correction maps** may be acquired with a source near the detector whose distance may be specified to be able to correct the dome effect caused by nearness. The default value is 0 that assumes a flood source or a point source at 5 diameters or farther.
- Maps are now formed by **two separate files:** one with intrinsic uniformity correction and the other with collimator only uniformity correction. That way, as long as the collimator does not change or suffers any damage, only intrinsic correction map must be redone periodically.

2010.12.27: V3.3

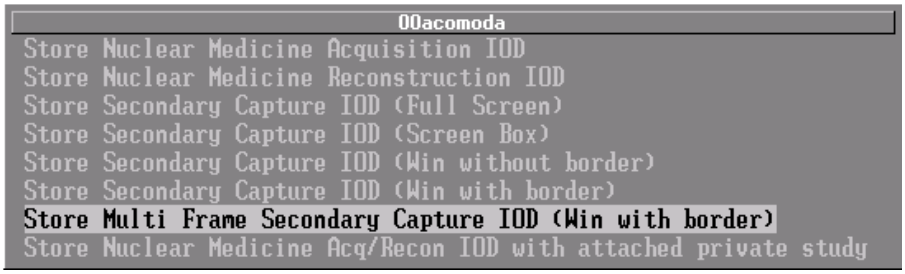
► **DICOM:**

- Changes in **import/export** for greater compatibility with particular features of other manufacturers.
- Compatibility with **non-standard SPECT acquisition arcs** (101.25 or 202,5 grados) when importing studies.

- The **DICOM server** may receive studies into memory or save them automatically into hard disk, all together or classified by the sending Application Entity.



- **CStore button** allows to export a static multi-view as separate DICOM objects, 1 image each, for greater compatibility with DICOM servers or viewers of other manufacturers that cannot interpret correctly view names in that kind of studies.
- **Filter by modality** to reduce the number of rows shown when exploring the directory of a remote DICOM server.
- Option to store the **full IM512P study information** as a private attibute to recover it if the study comes back to any IM512P (size, position and number of windows, color tables, curves and regions of interest, annotations, comments and labels, etc.) as if the study were stored in the IM512P data base.
- Option to export cines in **Secondary Capture Multiframe** format (by using Cstore button or ExpDICOM, or by configuring Send Study button).



► **Interfile:** greater compatibility with other manufacturers.

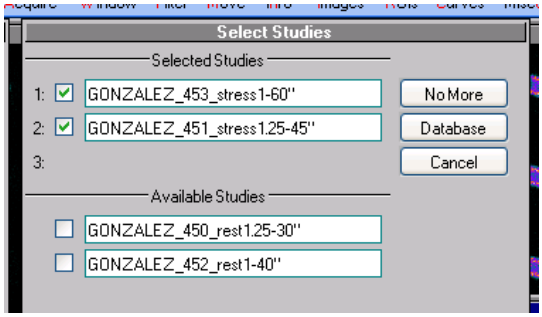
► **Study-Open** allows to read **studies of Sopha/SMV DS7.**

► Changes in the installer for better **compatibility with Windows Vista.**

► No more need of typing the extension when saving files with a known default extension (ExpPCX, ExpJPG, ExpAVI).

► **CardiacSPECT:**

- Greater **flexibility when selecting studies** to process (from memory or the data base) and setting its order. It allows to process 2 stress or rest studies together (3 image set in total):

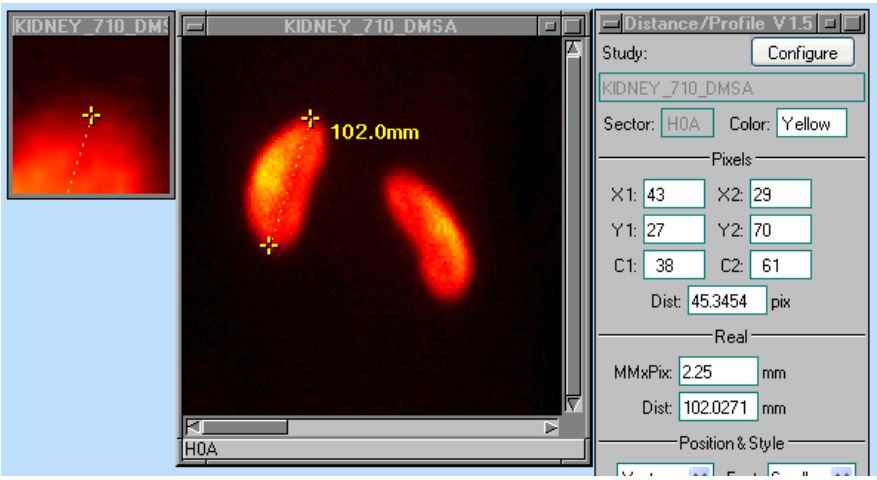


- **Quality control screen of detected myocardial edges and valve plane,** and estimated volumes. **Endo and epicardial contours** may be seen overlaid upon medial slices in this screen and upon all the slices in Slices screen, beating or in each individual interval:

- The algorithm used to detect endo-epicardial edges and valve plane was reviewed to get a **better correlation with other GSPECT methods** recognized and clinically validated, even in case of severe perfusion defects. In some cases, this resulted in a decrease of volumes that have been considered higher than expected for several users in previous versions. Users that had calculated their own normal values based on versions older than 3.3 must review them.

► **Dist/Profile:**

- Improvements to make its use easier and to add new functions (zoom at the end of the "rule", more visible ends, autocalibration ability, marks of cursor position on the profile if the curve is analyzed, etc.):



- Three configuration options to interpolate inside the pixel: counts at the center, at the left upper corner or no interpolation (the value is repeated).

► **Curve Analysis:** if any protocol left cursors as marks on the curve, their positions are not lost if the curve is analyzed, and they are restored when the analysis menu is closed.

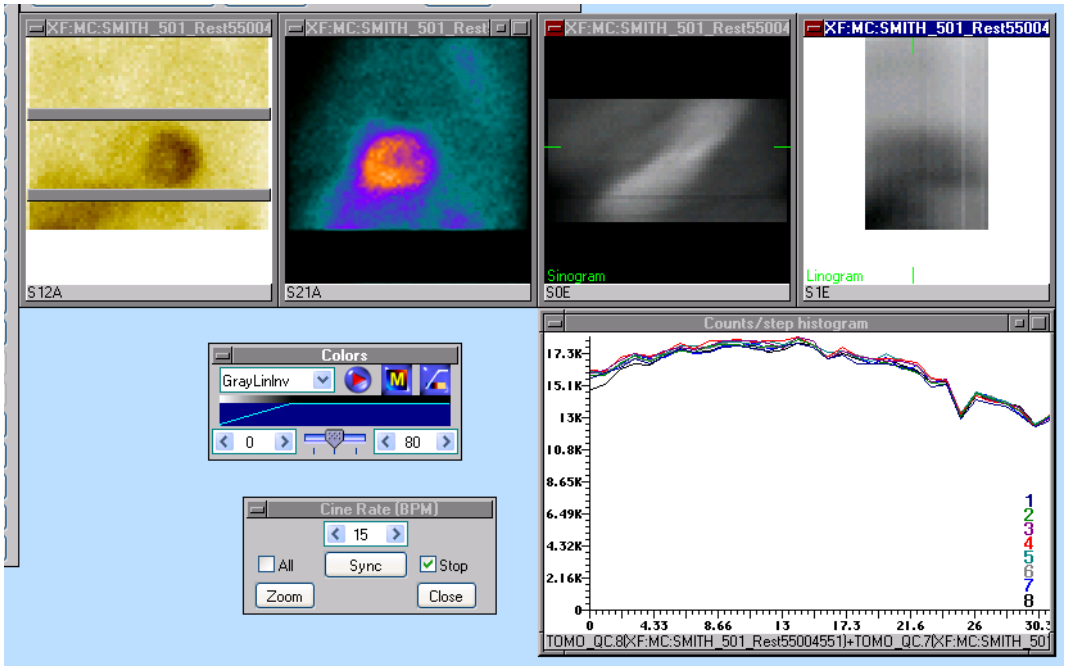
► **New demo data base** with more studies to practise all the protocols.

► **Compatibility with Windows 7 and Windows Vista**, all versions, 32 or 64 bits.

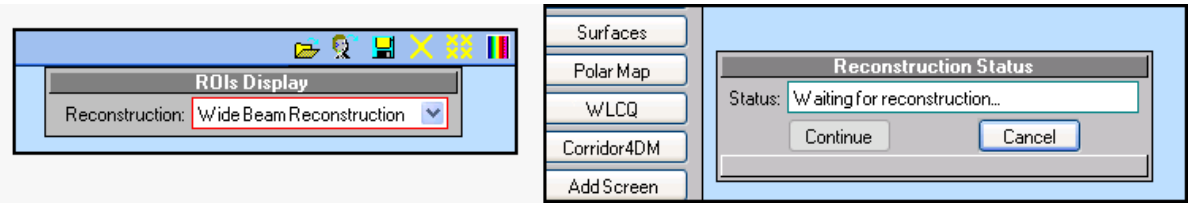
2009.06.08: V3.2 (new release)

► **CardiacSPECT:**

- General configuration is now independent of 3D Reconstruction and 3D Analysis, with new fields like AutoSave and reconstruction method selection (optional). Option to normalize the slices to 255, values > 255 or not to normalize.
- **Sinogram, linogram** and **curve of counts/step** for acquisition quality control:



- **Wide Beam Reconstruction** by UltraSPECT (optional) if this external device is connected through a network. The IM512P sends the projections, waits until UltraSPECT gives the slices back and then continues by reorienting the transversal slices just received. (WBR is a trademark of UltraSPECT Ltd.)



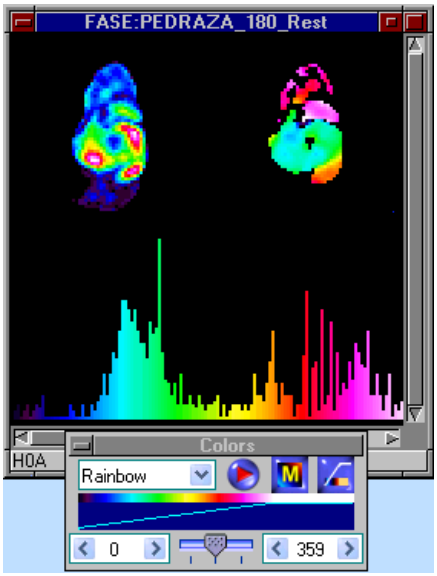
- New button to analyze slices with **Corridor4DM**, if this software (optional) is installed in the same computer. Once the analysis ends, CardiacSPECT resumes at the point where it was. Also in CardiacReview and 3D Analysis. (Corridor4DM is a registered trademark of INVIA, LLC.)
- **Reconstruction filters** may be preset according to gated/non-gated, isotope, comments, counts inside a ROI.
- **Compatibility issues** with word mode slices imported (from other manufacturers) and re-exported solved.
- **ManualOrient screen** nows displays the X, Y and Z angles values resultant from reorientation, to better reproducibility in case of manual adjustments.

► **ImpDICOM:** when **Data Origin: File**, the file extension is kept as a part of the file name in memory, instead of keeping only the name without extension. This allows to have projections and slices of different planes previously exported simultaneously in memory (nn.dc1, nn.dc2, nn.dc3, etc.) without need of closing one to import the next.

2008.12.17: V3.2

► **Phase** (planar):

- The protocol now shows **phase image** with values between 0 and 359 (word mode), to get a direct correlation with phase angle. Values 0-255 are used only if phase image is byte mode.
- **Phase histogram** was moved 180 degrees to follow the convention used by other modern systems.



► **DICOM:** Compatibility with systems that stack transversal slices in contrary order.

► Changes in **installer** for compatibility with **Windows Vista.**

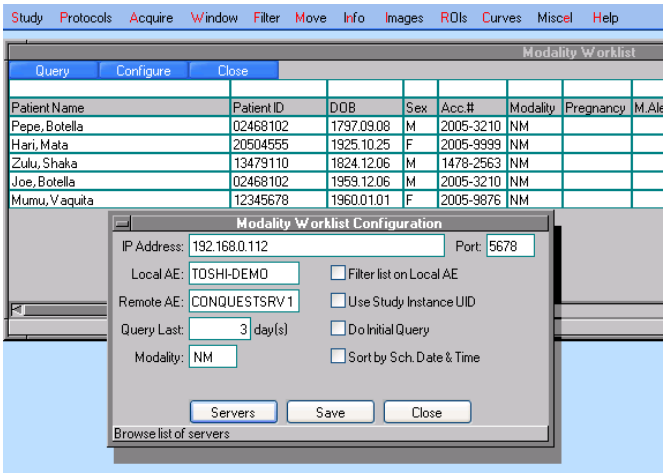
► Improvements in **AddToDB:**

- Fields may be edited instead of closing the form if erroneous or insufficient data.
- Date fields admit several separators (none, dot, slash, dash), while keeping the format yyyymmdd.
- New fields added: isotope, collimator, slice label, Accession Number and MWL_PatientID.

2008.08.19: V3.1

► **DICOM:**

- When exporting **static multiview** the name of the views is exported (if they were acquired with Acq2). Also isotope and collimator information.
- **MWL** allows to filter by modality and to set the number of days the query spans backward. Study type may be got directly from MWL.



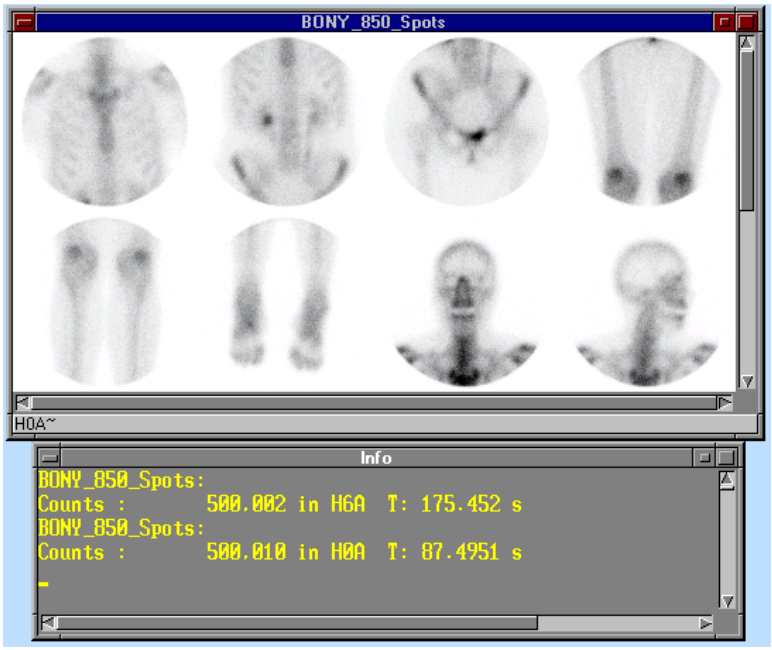
- When exporting studies, information about patient orientation respect to gantry is preserved.

► **Choosable default colors** to draw regions of interest, labels and identification (Acq2), according to preference of black or white background.

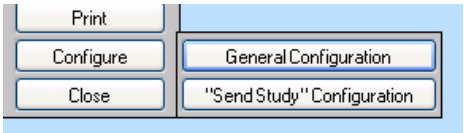
► During installation or update a **backup of all factory configuration files** is done (c:\adq\cnf\backups\ folder) in case the user needs to recover someone separately in the future (no need of resetting all to factory values).

► Restriction to no more than 31 characters in printer names using **WIN32 driver** was eliminated.

- **Thyroid** protocol:
  - Now dose and thyroid image may have different study number (not recommended but it may happen).
  - Isotope is directly read from acquired images (it may be edited).
  - A **multiplier factor** was added to dose when using calibrated capsules. Default value: 1.
  - **Background counts** are reported in the final screen.
- **Info-Counts** reports also how much time acquisition lasted:

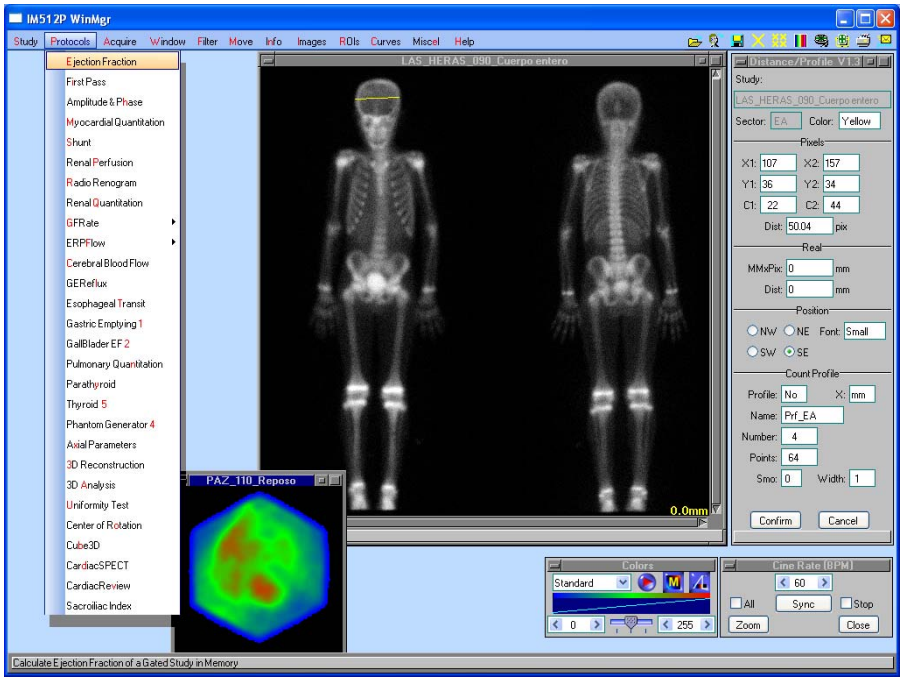


- **CardiacSPECT**: configurable "Send Study" button to automate which screens are documented and/or stored and by using which means (printers, disks, remote servers, etc.):



2008.02.13: V3.0

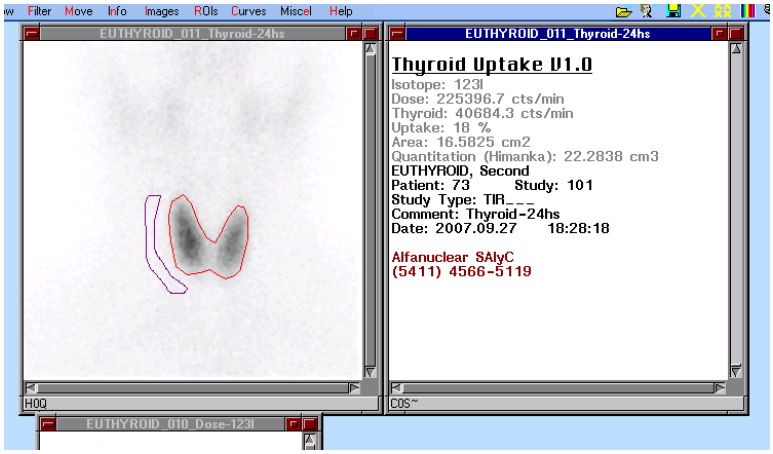
- New visual user interface:



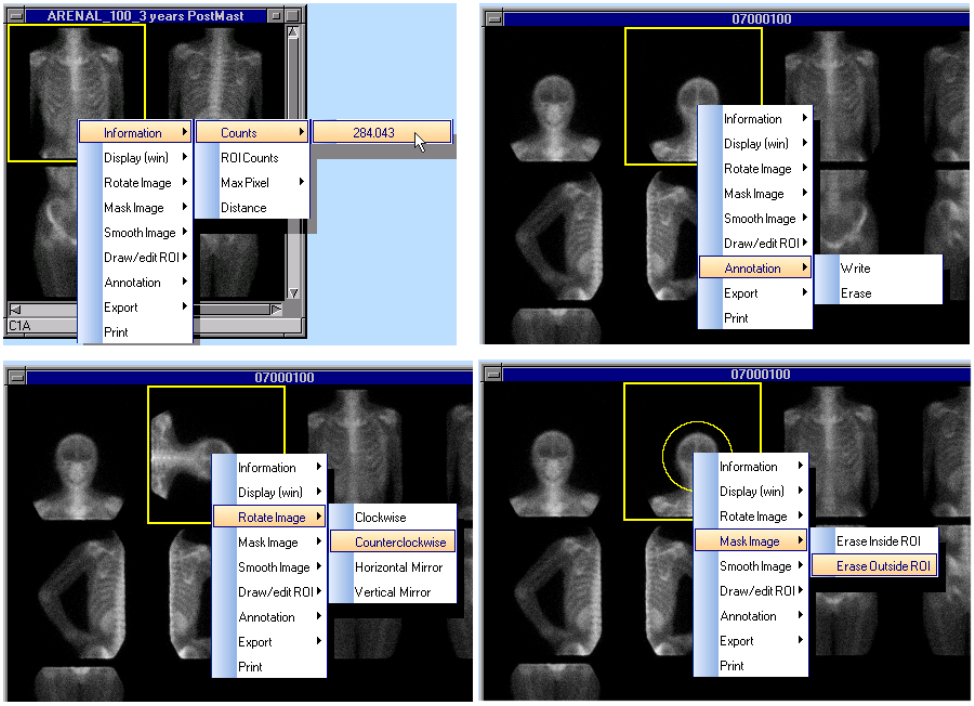
► Two Phase **renogram**: total number of counts now may be edited if acquisition was interrupted before the preset time, to avoid the curve to fall off.

► **Glomerular filtration rate**: time correction added in case syringe images are not 1'.

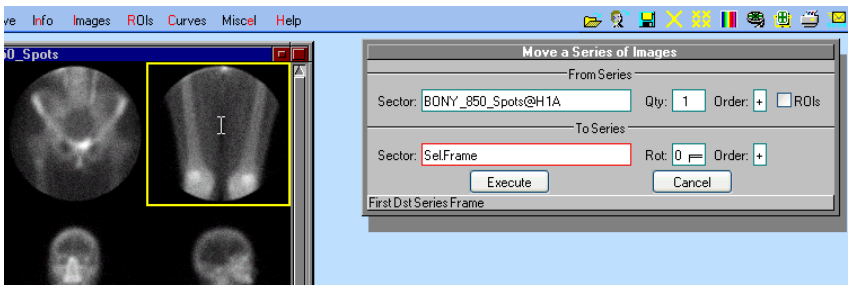
► **Thyroid**: new protocol to calculate uptake of ^{131}I, ^{123}I or $^{99m}TcO_4^-$ (taking into account each isotope decay) and gland area. Optionally, thyroid mass or volume may be estimated by using Himanka-Larsson, Ohkubo, Allen or ellipsoid methods:



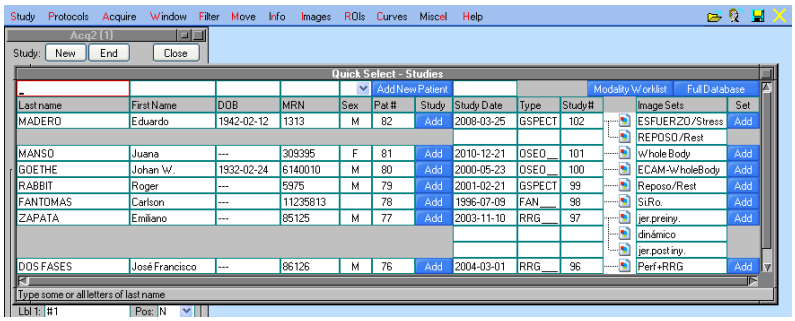
► Several fuctions accesible with a **right click** directly on the image: total counts, counts in a region of interest, maximum, distance, drawing and editing of ROIs, masking, rotation, smooth, annotations, documenting, etc.:



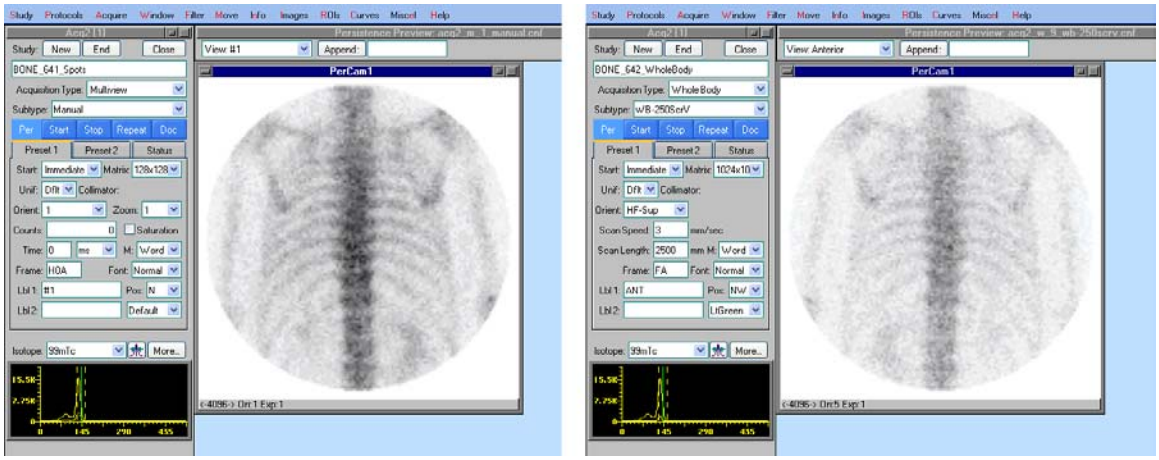
► Any frame at sight may be selected by moving a box over the images and clicking on it:



► New **acquisition protocol** with a new user interface to allow a quicker access to acquisition by limiting the data that may be entered:



► New **acquisition presets** including easy selection of lenght and speed of whole body scans, easier 2 phase dynamic presetting, preset labels and order of acquisition different from order of documentation in static multiview studies, etc.:



► Ability to acquire from 2 gamma cameras simultaneously and from a model of 2 detector camera (BHPT).

► Simpler generation of user uniformity correction files for several isotope-collimator pairs.

► Gamma camera selection during installation to load specific configurations for that model:

- XRT/R91x
- XCT/C61x
- ACT/C61
- Orbiter
- OrbiterE-75
- OrbiterE-37
- T-Quest
- C-Quest
- Omega 500
- SX300
- Dynascan
- 400T (slave)
- 400T (master)
- Planar

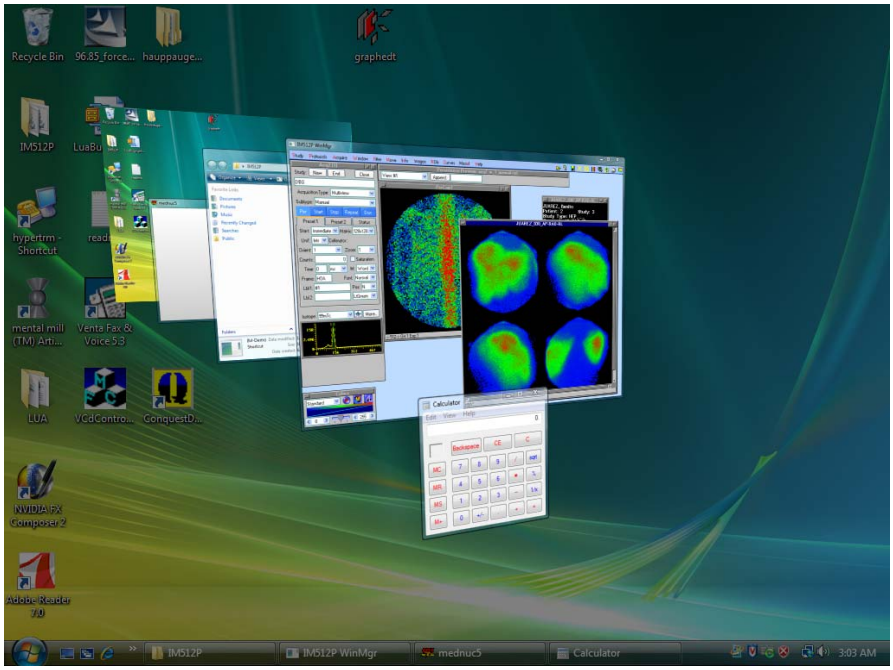
or keeping the previous configuration.

► **DICOM:** secondary capture configuration to select the color format and be compatible with other systems that only accept one of both possible formats (RGB RGB ... RGB or RR...R GG...G BB...B).

► **Modality Worklist** (MWL) may be used.

► **3D Reconstruction** protocol can reconstruct 256x256 projections in addition to 64x64 and 128x128.

► Compatibility with 32 bits color and **Windows Vista Aero**:



► Ability to receive ECG signal (analogic and gating pulse) through optical fiber from our **new ECG-RMT:**

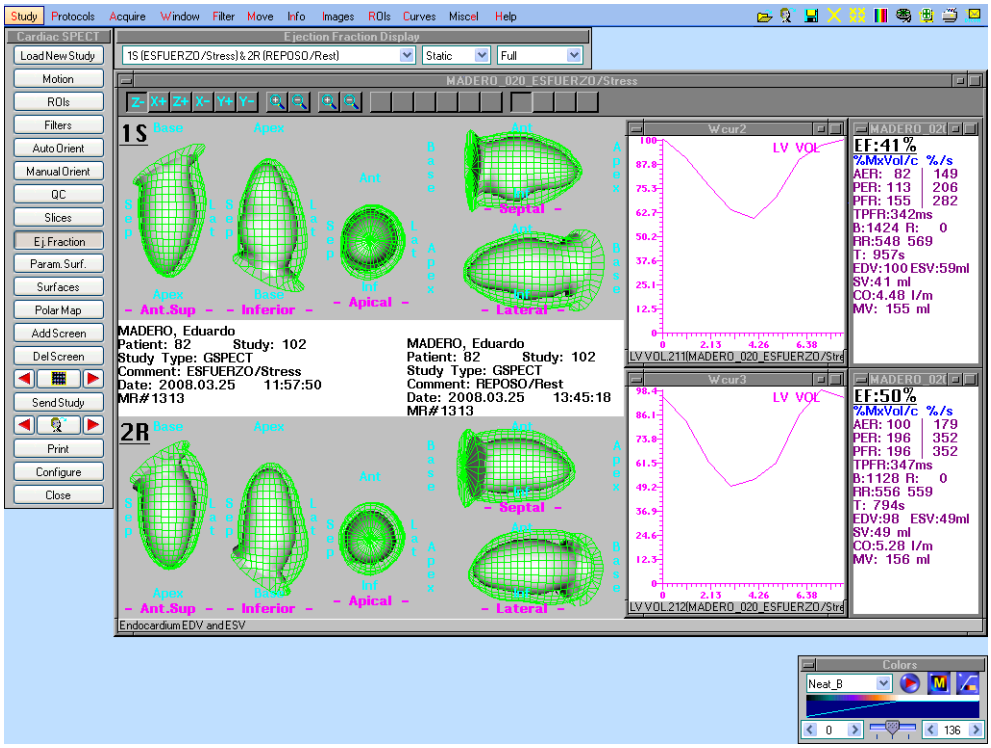
2005.12.21:

► **DICOM:**

- Ability to import via DICOM and combine SPECT projections from some two head gamma cameras (GE Optima, Millennium), gated or not, with uniformity and center of rotation correction.
- Changes in identification of DICOM exported image sets to guarantee unicity without losing relationship among data sets of the same study.

► Numerical data entered by the operator in **glomerular filtration rate** and **ERPF estimation** with one blood sample protocols are now reported in documentation page.

► Configurable colors for background and text in protocol documentation pages. This allows a considerable ink saving by eliminating black background. Two default color sets were defined (for white or black background), and the user may edit them:



► Ability to acquire simultaneously **3 separate images with 3 energy windows** (until now only 1 or 2 simultaneous images might be obtained).

► A parallel port is no more needed in the computer.

2004.11.25:

► Command to **add imported studies to the DB** (DICOM, Interfile, other IM512P). Several data may be retouched to unify study types, etc.

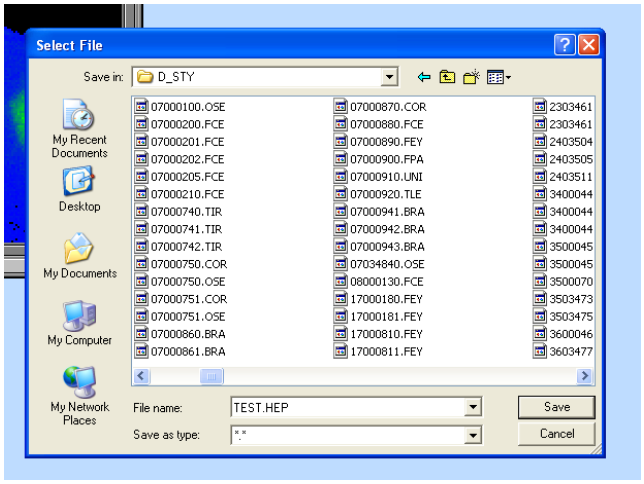
► **CardiacSPECT:**
- Zoom x2,5.
- Ability to slide slices (reversibly) approaching or withdrawing them without affecting volume calculation.

► **Elliptical orbits** may be used wih some SPECT cameras.

2004.04.23:

► Improvements in **ExpDICOM** to guarantee identifiers unicity.

► Directories similar to Windows Explorer in commands related to disk files (Open, SaveAs, ExpPCX, etc.):

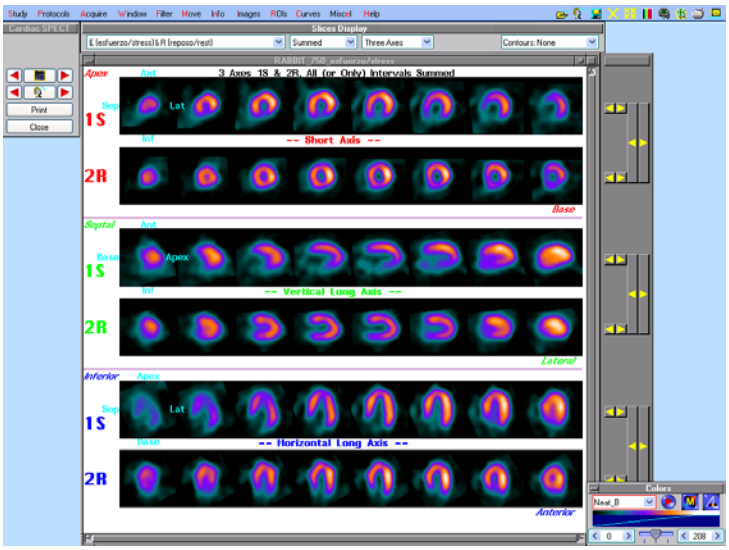


► **New program installer.**

► Changes in **Gall Bladder EF protocol:** now the summary image uses the same matrix size and depth than original images. This image is less smoothed than before and interpolated (reversible).

► **CardiacSPECT:**

- In addition to a continuous interpolated **zoom** for the slices, the user may select several fixed % or mm/pix values. When 2 or 3 studies are analyzed together, the needed zoom is automatically applied to get the same pixel size in all the slices, even in case of different acquisition pixel size (it may be changed manually).
- A configurable **series of screens** may be generated to review in identical conditions (color, etc.). A list of studies may be also created to subsequent reviewing with **CardiacReview**, without entering **CardiacSPECT:**



- Initial parameters may be set now directly in **CardiacSPECT.**

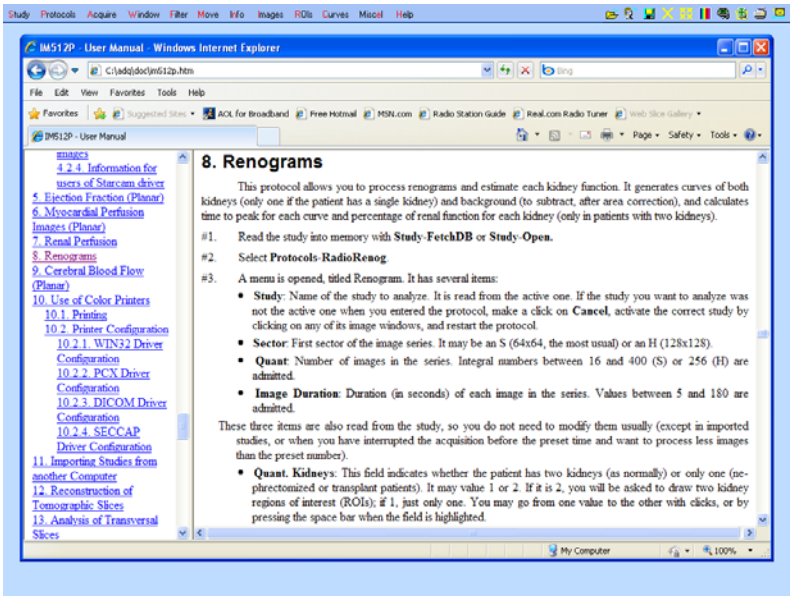
► Ability to **export** (version 3.31) and **import** (version 3.2 or 3.31) **Interfile format studies.**

► **Energy correction** available for **Siemens Orbiter gamma cameras.**

► **Sliding mask** for whole body acquisitions when using rectangular FOV cameras with Starcam/XCT/XRT driver.

► Communication with **Picker Prism 1000** gamma cameras via TCP/IP and Interfile 3.2. When gated studies are imported, the 8 Prism's files are imported together and combined into one (Interfile version 3.2 did not support gated files). Prism's images must have been acquired with parallel collimator (CardioFan is not allowed).

► **HTML format manuals** copied into hard disk during system installation or update for on line consulting by clicking on Help-General or Subject:



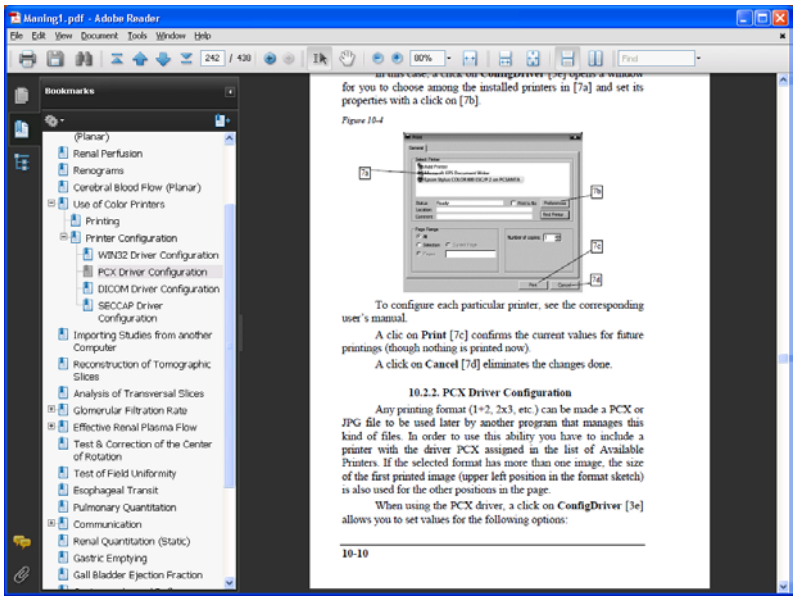
2003.06.20:

► **MemIndex** allows to see more information about the studies in memory.

► **ExpDICOM** can export a window in addition to the whole screen, rectangular boxes, acquired images and reconstructed slices.

► **Movie files** (AVI, MPEG, WMV and others) may be imported as color movies or as dynamic monochrome studies.

► **PDF format manual** included in the installation disk, to consult on line or printing:



► **Virtual printers** for printing to a DICOM server (secondary capture) or to PCX or JPG files in c:\adq\media folder instead of printing in paper or other physical media.

2002.11.28:

► Changes in **Renogram protocol** to accept 2 phase 128x128 acquisitions.

► Improvements in **ImpDICOM** when receiving files from a server. CT or MRI parallel slices may be concatenated to create a volume and analyze it with 3D Analysis.

► **Automatic calculation of FWHM and FWTM** between both cursors in a curve.

► **Profiles** thicker than 1 pixel.

► **Help tutorials** that use the Windows voice synthetizer.

► **3D Analysis and CardiacSPECT can be integrated with Wackers-Liu myocardial quantitation program (optional): http://www.medx-inc.com/addons.html.**

2002.06.13:

► Ability to **export windows or the whole screen in JPEG format** (lossy) **in addition to PCX** (lossless).

► Ability to select the **ROIs color** when drawing outside the protocols.

► Ability to **write annotations in curve windows.**

2002.03.02:

► Changes in **Renal Perfusion** and **Renogram protocols** documentation to accept 128x128 images and larger number of acquired frames.

► **Default Annotations color** according to black or white background preference.

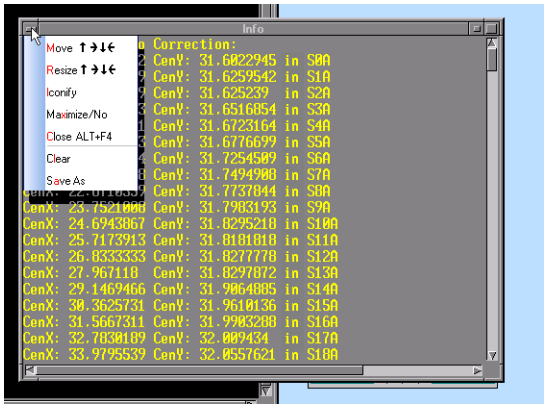
► **Rectangular detector gamma cameras** may be used with full corrections.

► Changes in several commands to allow working on a series of images instead of on a single frame: constant adding, masking, etc.

► **Automatic pixel size calculation** of an image by typing the (known) distance between two points.

► Improvements in the **printer driver** for easier printing of two or more copies.

► **Info window** (total counts, ROI counts, number of pixels, density) enlarged up to 256 lines. It may be saved as a text file:



► Ability to **record cine displays from screen as .AVI** files to be seen with other Windows applications.

► Ability to **print** the whole screen, any rectangular box or any window (with or without its border).

► **c:\adq\media folder** where all the pictures and movies are saved by default. A shortcut to this folder is created on the task bar. ImpPCX reads this folder by default (it may be changed):

► **ImpDICOM** accepts color screen captures (only monochrome previously).

► Images may be displayed with **interpolation** to avoid pixelation when large display zoom is applied. Unlike smooth, interpolation is fully reversible.

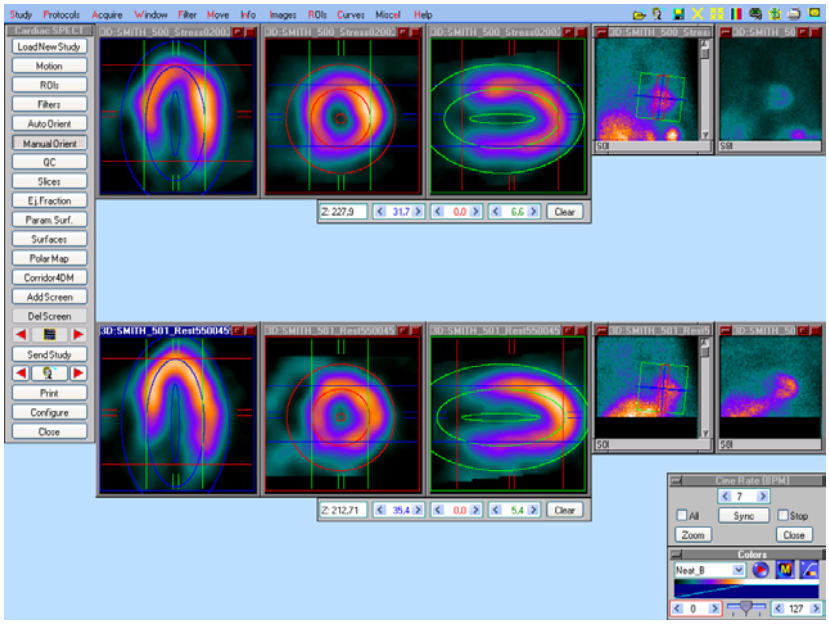
► **Detector calibration** menu reduced for regular use (only uniformity).

► Ability to add **post-reconstruction smooth** in CardiacSPECT.

► When a **cine display** is interrupted, the right and left keyboard arrows allowed to go forward or backward. Now you may also move the mouse while keeping pressed the right mouse button to go along the series of images.

2001.06.19:

► **CardiacSPECT protocol** combining reconstruction and analysis of myocardial SPECT studies. Byte or word mode:



► Configurable initial slice thickness in **3D Analysis** and **CardiacSPECT**.

► Medical record number included in patient **identification** (if it was entered; non mandatory field).

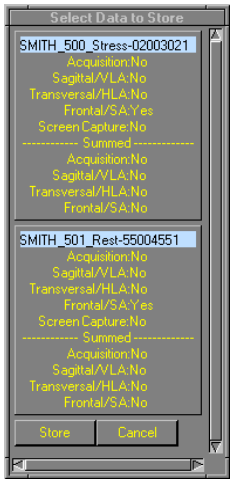
► **Diverging collimator for whole body** acquisition in adapted GE Starcam gamma cameras.

► Optional 1 or 2 background ROIs in **Renogram protocol**.

► **Motion correction** and special **GFRate protocol for veterinary version**.

► Improvements in identification of imported **DICOM** studies.

► Ability to **DICOM export** SPECT projections and slices (Fro/Sag/Tra, or reoriented: SA, VLA and HLA), and screen captures:



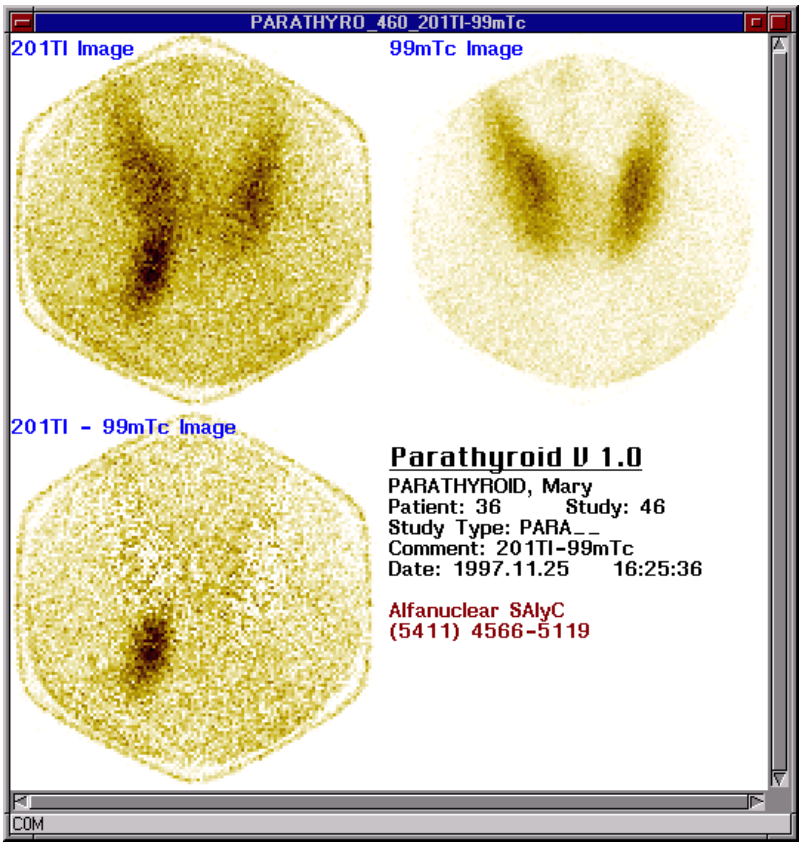
► **Cube3D protocol** allows to display 12 (instead of 6) slices of a volume, if started while Alt key is pressed.

2000.03.28:

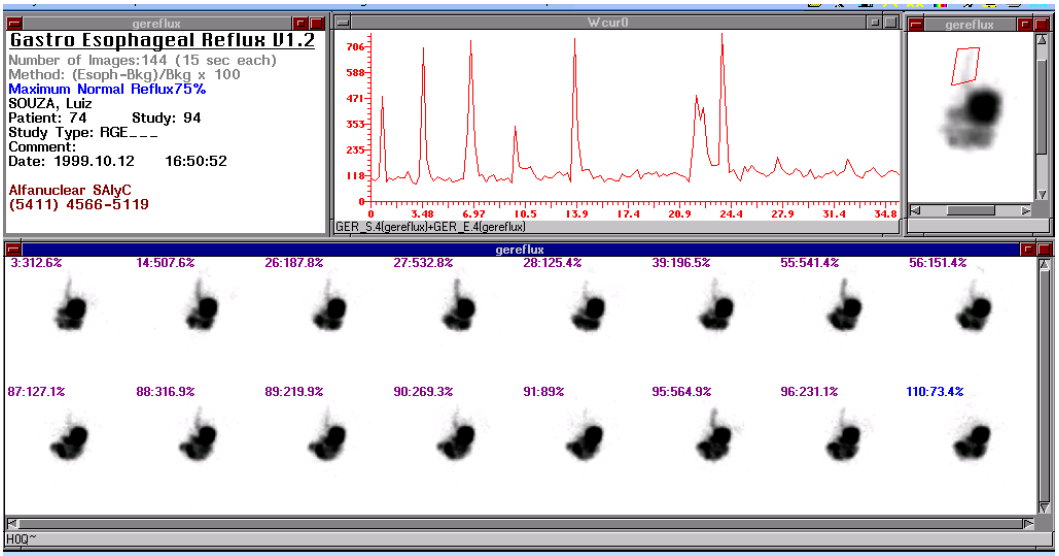
► **Gated SPECT** document pages:

- Simultaneous 3 axes, short axis, vertical long axis, horizontal long axis. Simultaneous 3 axes are displayed in 64x64 matrices; each separate axis in 128x128, independently of acquisition matrix.
- All intervals summed, a single interval, all intervals cine display.
- If 2 studies are analyzed simultaneously, they can be documented together (8 slices of each) or individually (16 slices).
- All options can be combined: 16 beating slices of each axis of a single study; 8 summed slices of each one of 2 studies; 16 slices of a given interval (e.g. end systole) of a single study; etc.

► **Parathyroid protocol**: image subtraction: ^{201}Tl-$^{99m}TcO_4^-$; $^{99m}TcMIBI$-$^{123}I^-$; $^{99m}TcMIBI$-$^{99m}TcO_4^-$; etc.



► **Gastroesophageal reflux protocol** with 3 options: only curve, esophagus vs. background activity esophagus vs. gastric activity quantitation:



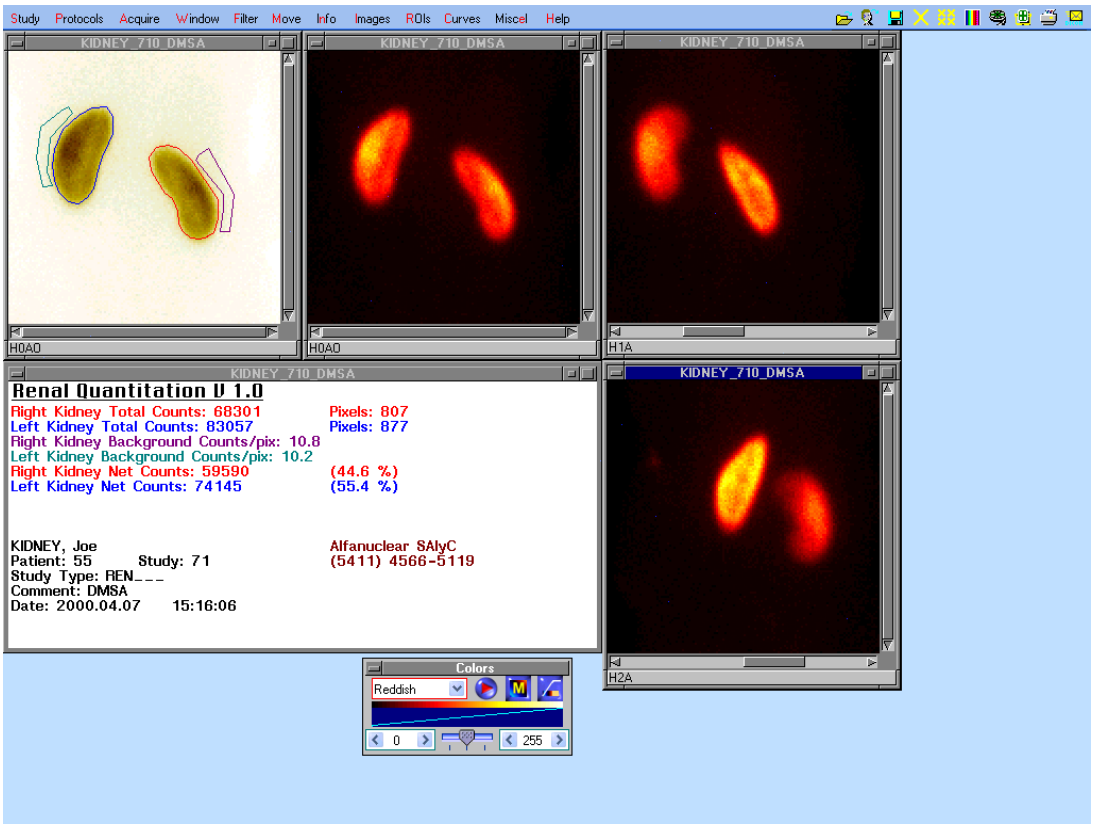
► **Myocardial SPECT**: polar map (bull's eye) with automatic or manual limits. Parametric surfaces in 3 colors corresponding to 3 categories (user defined by setting two thresholds) or in 256 colors.

► **Cine display** with or without interpolation.

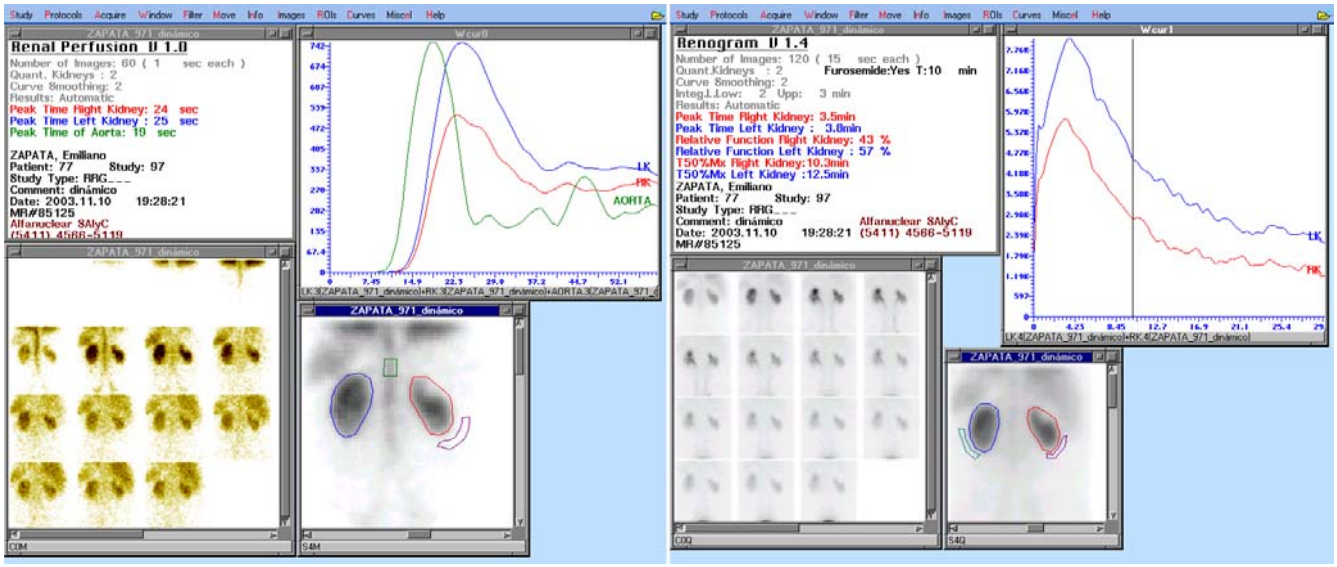
► **DICOM:** in SPECT studies, **CStoreBtn** allows to send the acquired images, non-reoriented transversal slices, or screen captures (full screen or a window with/without its border). If used during **3D Analysis**, frontal, sagittal and reoriented (SA, VLA, HLA) may be also sent.

1999.11.26:

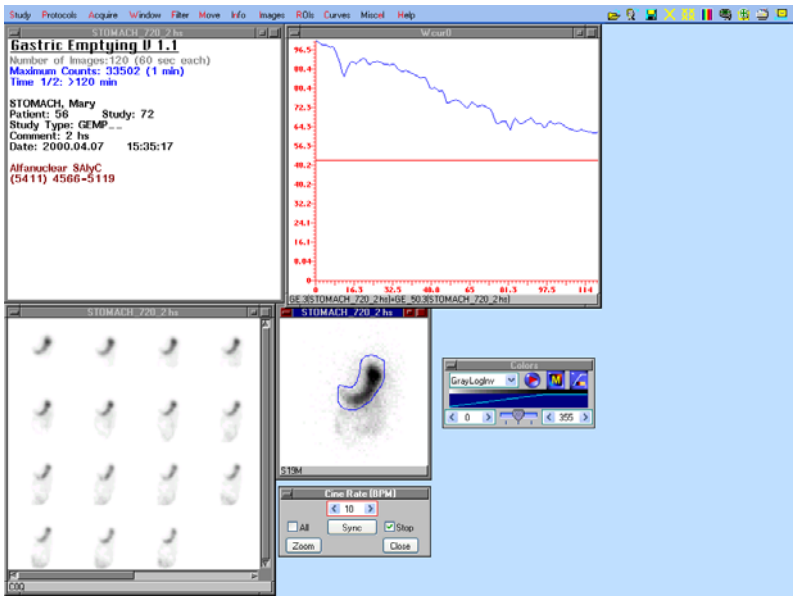
► **Renal quantitation** (static):



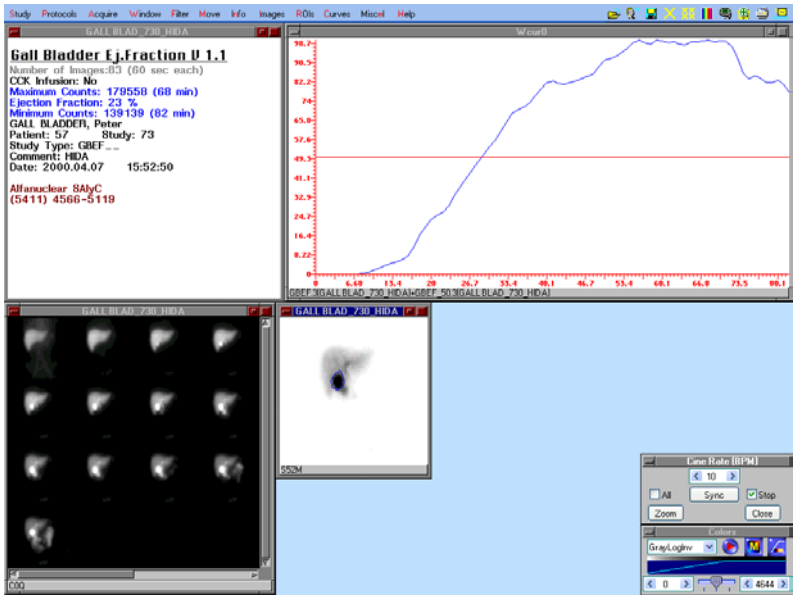
► **Renal Perfusion** and **Renogram protocols:** results pages included in the study, to save and review later without need of reprocessing (reprocess is always possible). In Renogram, if furosemide was used and the injection time was entered when processing started, a mark is set on the curve automatically at this time:



► **Gastric Emptying** calculation protocol:



► **Gall Bladder Ejection Fraction** calculation protocol:



► **Version /E of the IM512P**: upgrade for GE Starcam gamma cameras.

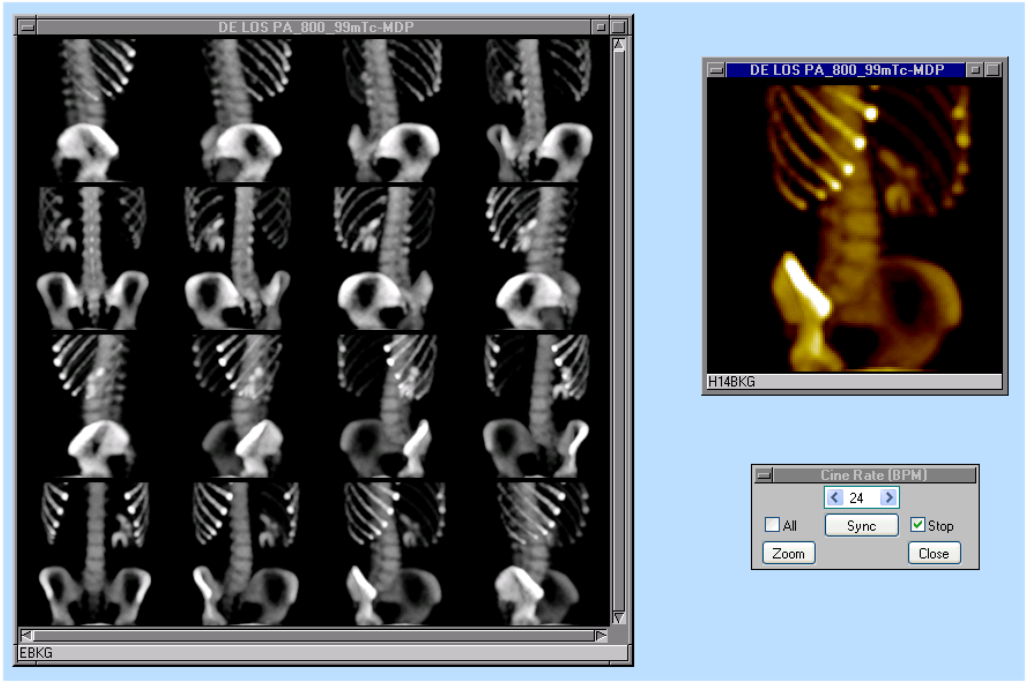
- The old computer and console built-in field correctors are replaced by a last generation PC.
- All field corrections and image processing are digitally done by the software at high speed.
- Only 2 of 25 original boards are left in the console. This reduces in more than 10 times the risk of failures due to components.
- Real time digital energy correction. Pulse height analyzer. Triple window and double isotope. Isotope data base with peak energy and window width preset by the user.
- Real time digital linearity correction. Better than 0.4 millimeter.
- Real time digital field uniformity correction. Each isotope-collimator combination may have its own correction map. Digital iris. Uniformity quality control protocol.
- Static, Whole Body, Dynamic, Planar Gated, SPECT and Gated SPECT acquisition. Digital persistence. ECG acquisition (analog tracing and gating).
- Simultaneous acquisition and processing.
- Acquisition matrices: 64x64, 128x128, 256x256, 512x512, 1024x1024, byte or word mode.

- Acquisition zoom: 1, 1.25, 1.33, 1.5, 1.75, 2, 2.5, 3, 3.5, 4, 5, 6 and 7. Digital acquisition pan to center any point of de image by clicking on it.
- Real time center of rotation correction for X and Y axes. COR quality control protocol.
- Gamma camera calibration and diagnostic protocol.

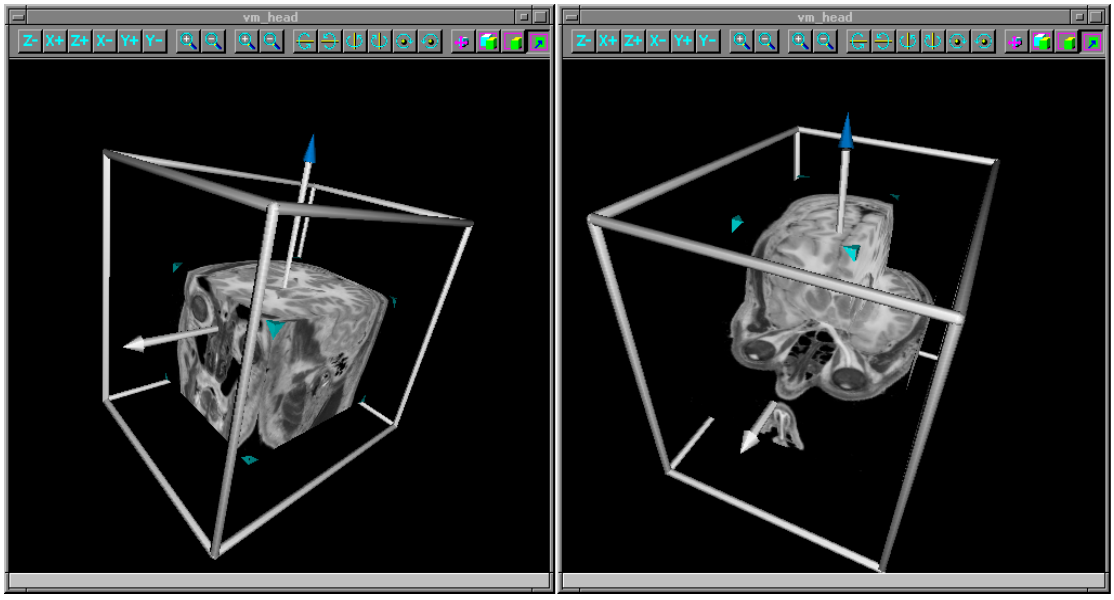
1999.07.27:

► **DICOM:** optional package to import/export this format files both from/to disks or DICOM servers.

► Documentation of SPECT **reprojection images** rotating around any of the 3 axes (X, Y or Z). The images may be seen side by side or rotating in a cine display. The user can adjust several parameters to get more realistic images, with shading that depends on the distance from the observer:



► **Cube3D:** protocol to display 6 slices of a volume on the 6 faces of a cube, viewed in perspective, or 12 slices on the 12 faces of 2 cubes. Cube size and position are changed by using the mouse:



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