



**Simposio: Il Laboratorio Digitale
finalmente pronto per l'uso quotidiano**

**La grande opportunità
dell'utilizzo di dati grezzi ("raw
data") da ogni tipo di ecografo**





NEMA, Suite 900
1300 North 17th Street
Rosslyn, VA 22209
Ph: (703) 475-9217
<http://dicom.nema.org>
dicom@medicalimaging.org



- importare in modo automatico insieme alle immagini le misure effettuate a bordo degli Ecocardiografi
- effettuare sulle immagini misure e calcoli derivati quali il calcolo di volumi, calcoli Doppler e anche calcoli complessi quali il PISA
- **archiviare e consentire il recupero di RAW DATA (campi proprietari DICOM) per ulteriori analisi di post processing avanzato delle immagini (in particolare il 3D, il Doppler tissutale e lo Strain) con software dedicati**

Il Laboratorio Digitale



L'ecografo esporta

- le immagini e le clip utilizzando il formato DICOM
- le misure effettuate a bordo di ecocardiografi mediante DICOM SR

Il Laboratorio Digitale

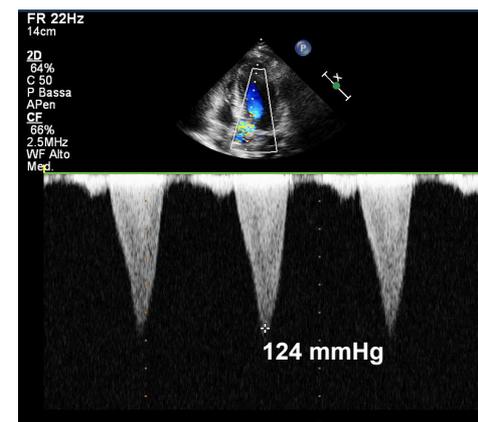
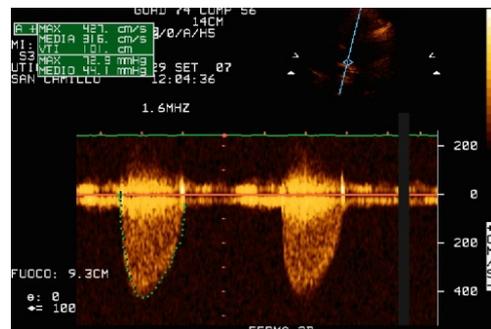
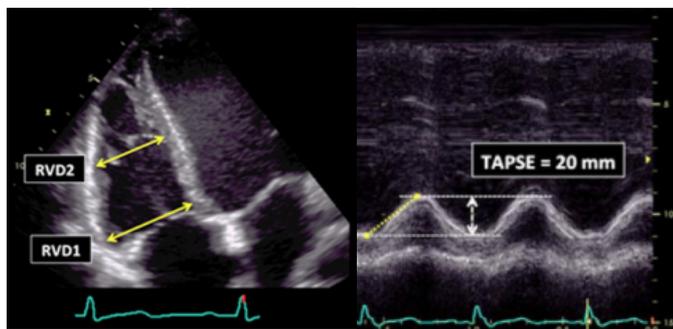
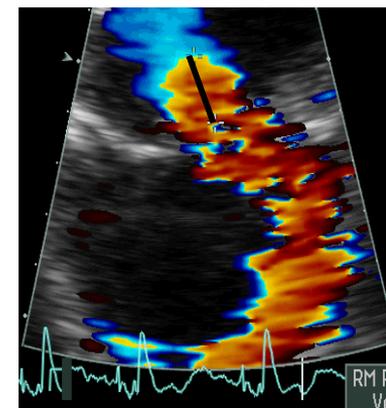
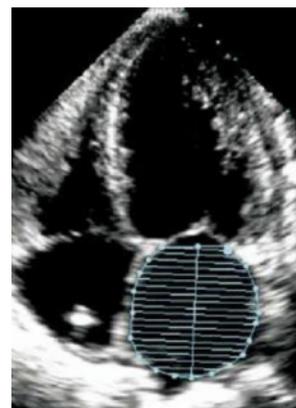
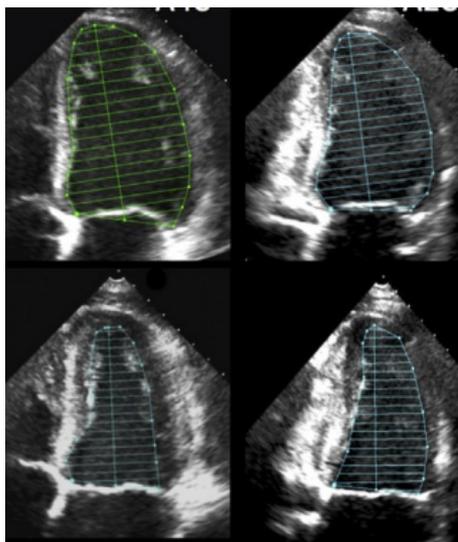
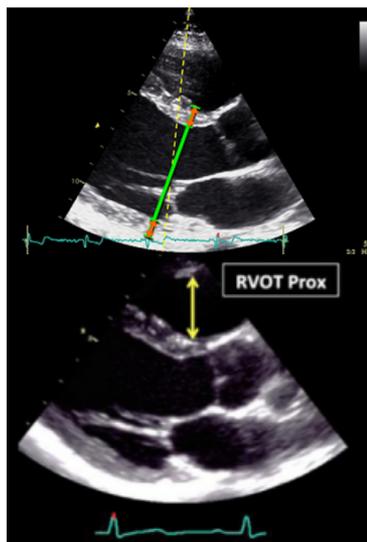


La workstation

- è in grado di ricevere, visualizzare ed elaborare l'esame (rivedere e confrontare immagini e loop, eseguire misure e calcoli)
- invia al PACS in formato DICOM le immagini e dati dell'esame con il referto finale in PDF che viene archiviato sempre in formato DICOM (DICOM Encapsulated PDF)



Il Laboratorio Digitale



Advanced quantification: tissue imaging, 2D strain, 3D

Expert Consensus for Multimodality Imaging
 Evaluation of Adult Patients during and after Cancer
 Therapy: A Report from the American Society of
 Echocardiography and the European Association of
 Cardiovascular Imaging

GUIDELINES AND STANDARDS

Recommendations for Cardiac Chamber
 Quantification by Echocardiography in Adults:
 An Update from the American Society
 of Echocardiography and the European Association
 of Cardiovascular Imaging

Table 2 Recommended cardio-oncology echocardiogram protocol

Standard transthoracic echocardiography

- In accordance with ASE/EAE guidelines and IAC-Echo

2D strain imaging acquisition

- Apical three-, four-, and two-chamber views
 - * Acquire ≥ 3 cardiac cycles
- Images obtained simultaneously maintaining the same 2D frame rate and imaging depth
 - * Frame rate between 40 and 90 frames/sec or $\geq 40\%$ of HR
- Aortic VTI (aortic ejection time)

2D strain imaging analysis

- Quantify segmental and global strain (GLS)
- Display the segmental strain curves from apical views in a quad format
- Display the global strain in a bull's-eye plot

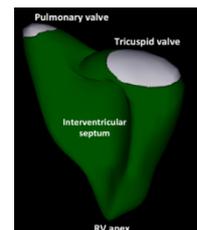
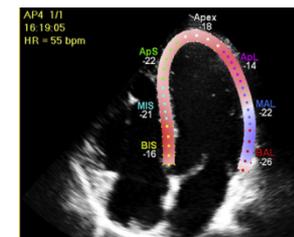
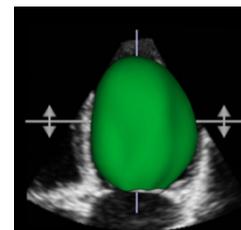
2D strain imaging pitfalls

- Ectopy
- Breathing translation

3D imaging acquisition

- Apical four-chamber full volume to assess LV volumes and LVEF calculation
- Single and multiple beats optimizing spatial and temporal resolution

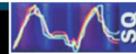
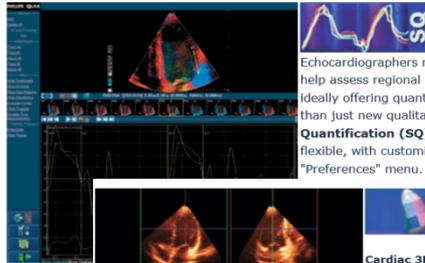
Recommendations. LV systolic function should be routinely assessed using 2DE or 3DE by calculating EF from EDV and ESV. LV EFs of $< 52\%$ for men and $< 54\%$ for women are suggestive of abnormal LV systolic function. Two-dimensional STE-derived GLS appears to be reproducible and feasible for clinical use and offers incremental prognostic data over LV EF in a variety of cardiac conditions,



Recommendation. In laboratories with appropriate 3D platforms and experience, 3DE-derived RV EF should be considered as a method of quantifying RV systolic function, with the limitations mentioned above. Roughly, an RV EF of $< 45\%$ usually reflects abnormal RV systolic function, though laboratories may choose to refer to age- and gender-specific values.

Il Laboratorio Digitale

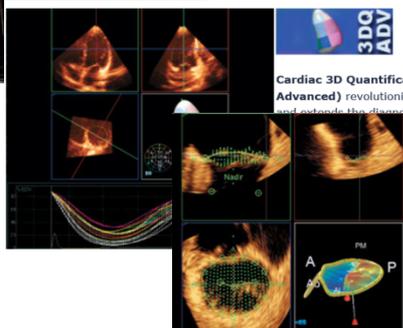
Archiviazione immagini in formato proprietario (Raw-data) indispensabile per ulteriori post-processing avanzati su piattaforme dedicate



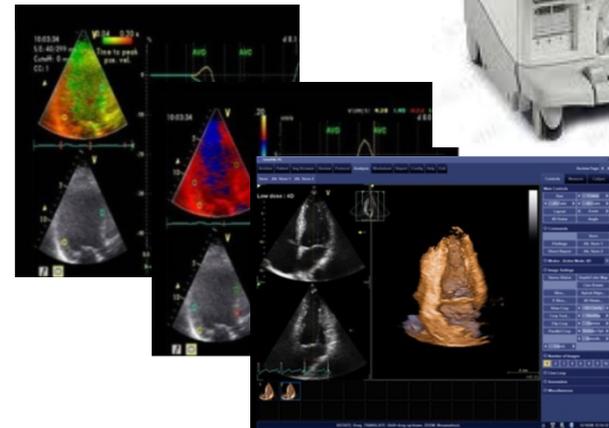
Echocardiographers requested better tools to help assess regional myocardial function, ideally offering quantitative capabilities rather than just new qualitative tools. The **Strain Quantification (SQ)** plug-in is intuitive and flexible, with customizable settings through the "Preferences" menu. The SQ plug-in can be



Cardiac 3D Quantification Advanced (3DQ Advanced) revolutionizes echo quantification and extends the diagnostic power of Live 3D

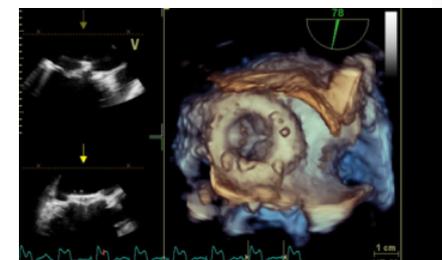
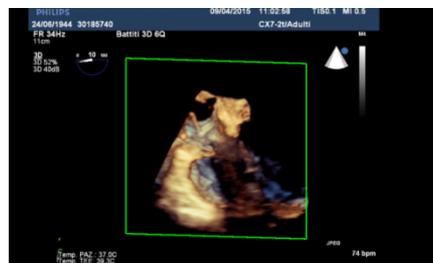
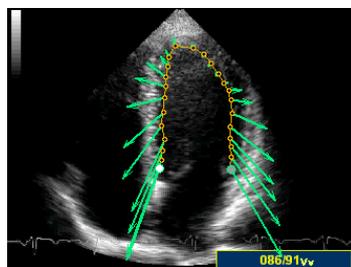
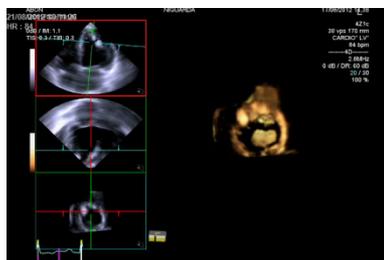


The **Mitral Valve Quantification** plug-in (**MVQ**) adds precise 2D and 3D quantification of the mitral valve anatomy and associated structures based on data acquired with Philips Live 3D Echo and the X7-2t transesophageal transducer. While Live 3D TEE provides you with views seen for the first time, MVQ provides quantification data available for the first time for cardiologists, cardiac surgeons, anesthesiologists and interventionalists.



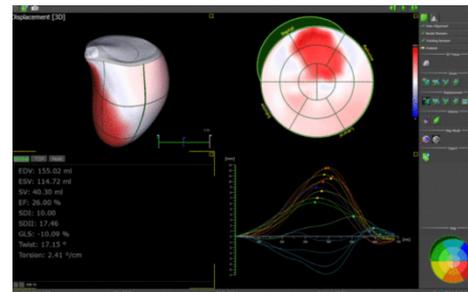
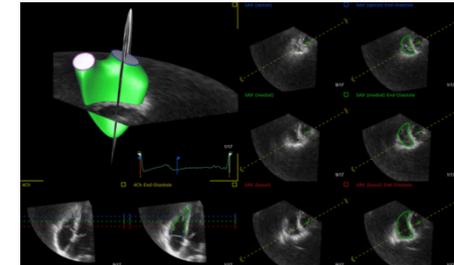
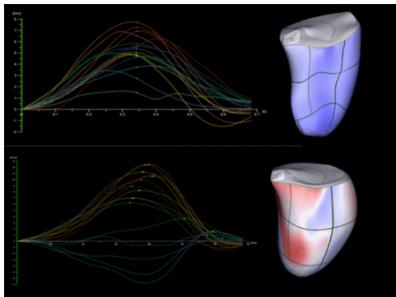


Il Laboratorio Digitale



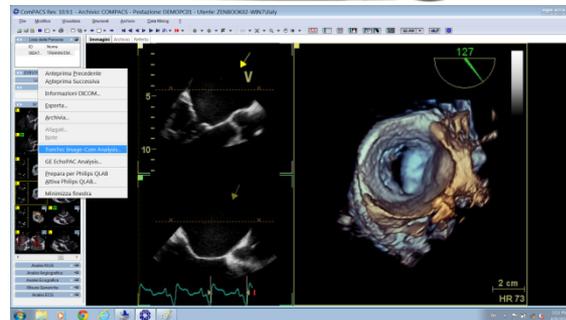
Il Laboratorio Digitale

Sono disponibili sul mercato anche software “vendor independent” per rivedere ed analizzare 3D echo data e per analisi avanzate





Il Laboratorio Digitale





Il Laboratorio Digitale

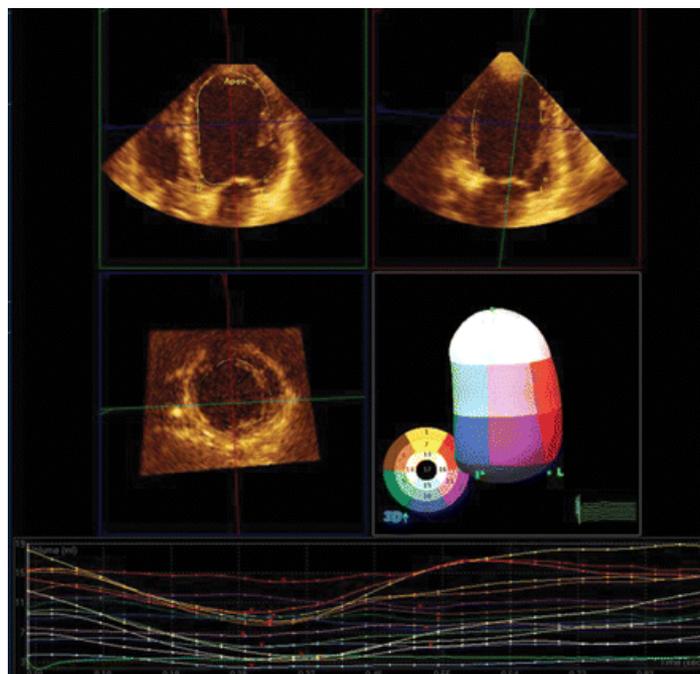
The image displays a complex medical software interface for 3D cardiac imaging. The main window shows a 3D volume rendering of a heart, with a color scale on the right. The interface is divided into several panels:

- Top Left:** A patient information panel with fields for ID, Name, and Date of Birth. It also shows a list of exams and a list of reports.
- Top Center:** A Philips QLAB window showing a 3D volume rendering of a heart. The interface includes a menu for 'View', 'iSlice', 'Trim/Crop', and 'Image Adjust'. Below this, there are controls for 'MPR' (Multi-Planar Reconstruction) with buttons for 'Reset MPR' and '3D Home'. There are also 'Mode' buttons for 'Volume' and 'Slice Plane'.
- Bottom Left:** A 'Controls' panel with three sections: '3DQ' (Measure distance, area, left ventricular volume, mass, and ejection fraction from a 3D data set), '3DQ Adv' (Measure the global and regional function of the LV from a 3D full volume data set), and 'GISDQ' (Provides tool to measure, rotate, crop, view, and access 3D volumes).
- Bottom Center:** A 'View Controls' panel with buttons for 'L/R Invert', 'U/D Invert', and '3D Swivel'. There are also 'Magnify' and 'MPR Smooth' controls.
- Bottom Right:** A timeline and playback controls section with a progress bar and buttons for '1-', '2', '3', '4', '5', '6', '7', '8', '9', '10', '11', '12', '13', '14', '15', '16', '17', '18', '19', '20', '21', '22', '23', '24', '25', '26', '27', '28'. The timeline shows a current position at 1/35 0.00s/1.81s (-Hz, 0.000s).

The interface is running on a Windows operating system, as indicated by the taskbar at the bottom showing various application icons and the system tray with the date 4/11/2015 and time 5:08 PM.

Il Laboratorio Digitale

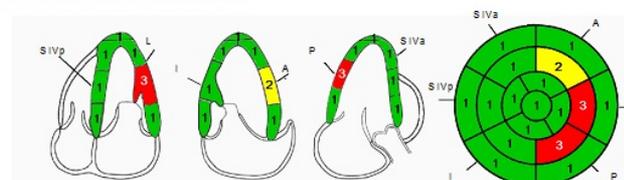
VALUTAZIONI MORFO-FUNZIONALI E FLUSSIMETRICHE



Volum e Diastolico :	169 ml	88 ml/m ²
Volum e Sistolico :	101 ml	53 ml/m ²
Frazione d'eiezione :	40 %	
Metodo Calcolo Volumi :	3D	

Spessore Setto iv. 1,2 cm

CINETICA VENTRICOLARE SINISTRA:



SIVa Setto anteriore I Parete inferiore L Parete laterale
SIVp Setto posteriore P Parete posteriore A Parete anteriore

Legenda:
0 Non Valutato
1 Ipocinesia
2 Acinesia
3 Discinesia
4 Normocinesia
5 Aneurisma

Wall Motion Score Index: 1.29

ATRIO SINISTRO :

Volum e Sistolico: 85 ml 44 ml/m²
Metodo Calcolo Volumi: Method of Disks, Single Plane
Area Sistolica: 24.88 cm²
Diametro Supero-Inferiore: 6,1 cm

ATRIO DESTRO :

Diametro Sup-Inf: 5,2 cm

Versione 2

Medimatic S.r.l

Pag. 1 di 2



Ma se l'esame è già stato archiviato.....

- Richiamare le immagini archiviate come Raw Data (**i Raw data nel PACS devono essere preservati**)
- Effettuare nuova analisi in post-processing
- Archiviazione del risultato del post-processing (nuove immagini, nuove misure)
- Integrazione del referto

Conclusioni

- Nella pratica clinica è sempre maggiore la necessità di completamento degli esami ecocardiografici con analisi “avanzate” (strain, 3D etc)
- Il laboratorio digitale deve essere in grado memorizzare i dati grezzi dei vari vendor (Philips, GE, Siemens, Aloka, etc.) e di preservarli
- Deve essere possibile richiamare gli esami tramite protocollo di DICOM Q/R in formato nativo che consenta la gestione dei dati grezzi con analisi avanzate (strain, 3D, etc.) utilizzando sw dedicati.



Grazie per l'attenzione!

