

Strain e speckle tracking: è giunto il momento di introdurli nella pratica clinica?

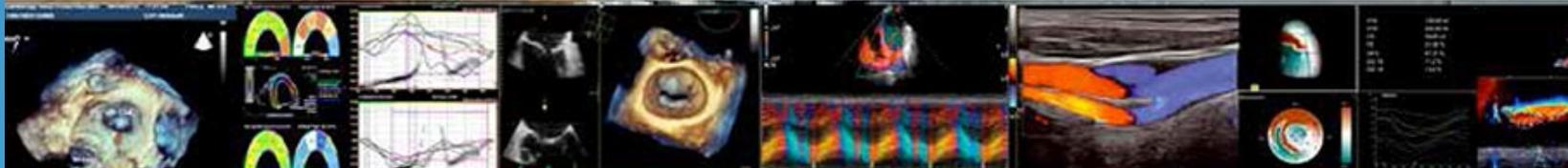
SILVIA GHIDELLA - ALESSANDRIA

ECOCARDIOGRAFIA 2015

XVII Congresso Nazionale SIEC

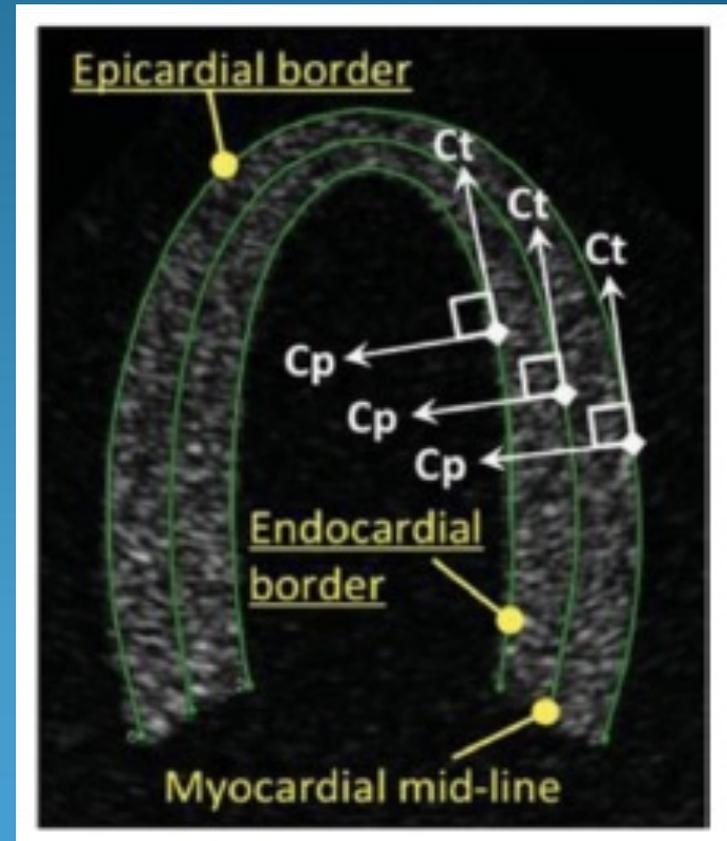
Hotel Royal Continental

Napoli, 16-18 Aprile 2015



$$\varepsilon = \frac{\Delta L}{L_0} = \frac{L - L_0}{L_0}$$

Strain



Speckle tracking 2D

CARATTERISTICHE

Angolo
indipendenza

Buona
riproducibilità

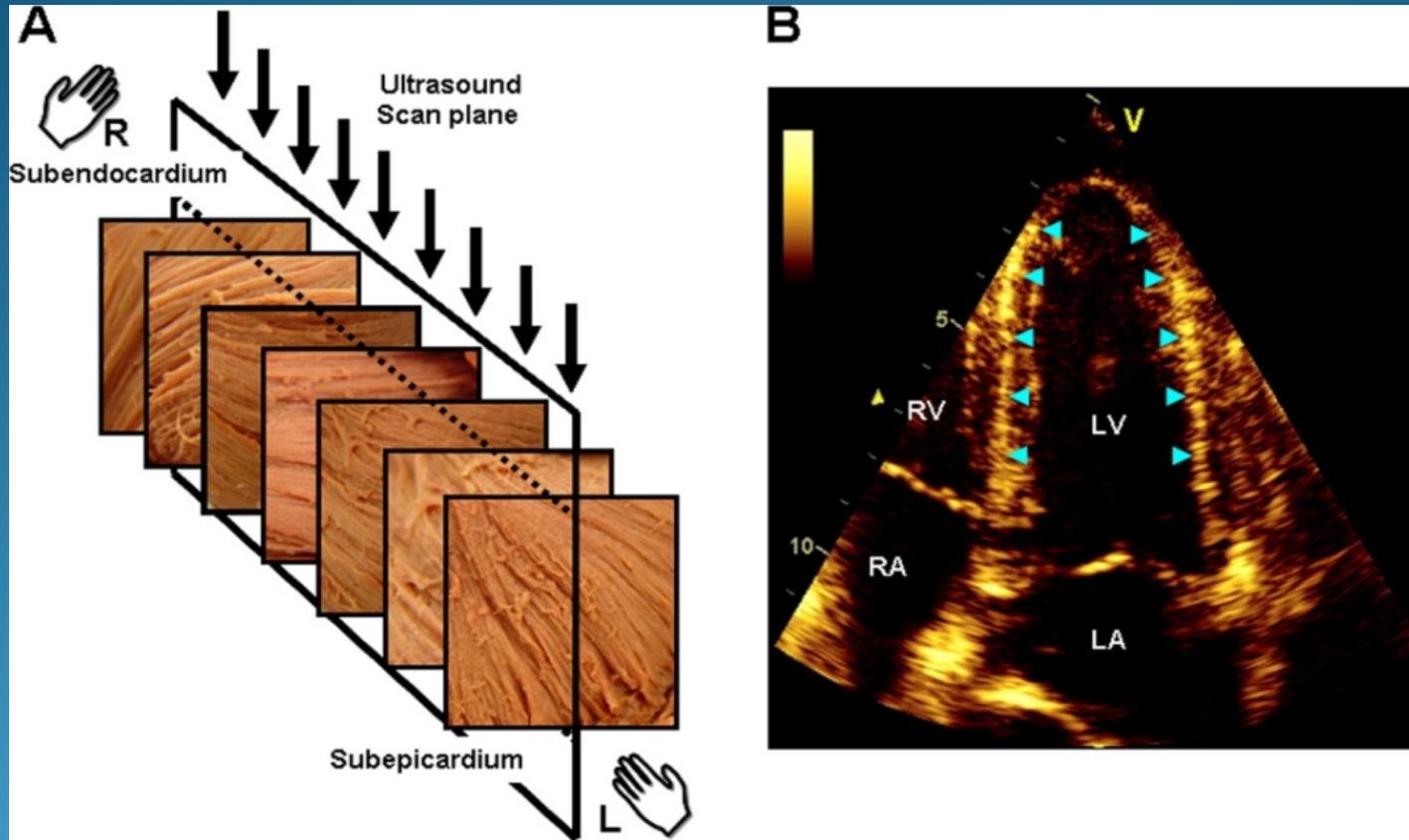
Elevata
risoluzione
spaziale

Facilità d'uso

Non influenzato
dal tethering

Strain
longitudinale,
radiale,
circonferenziale.

CARATTERISTICHE

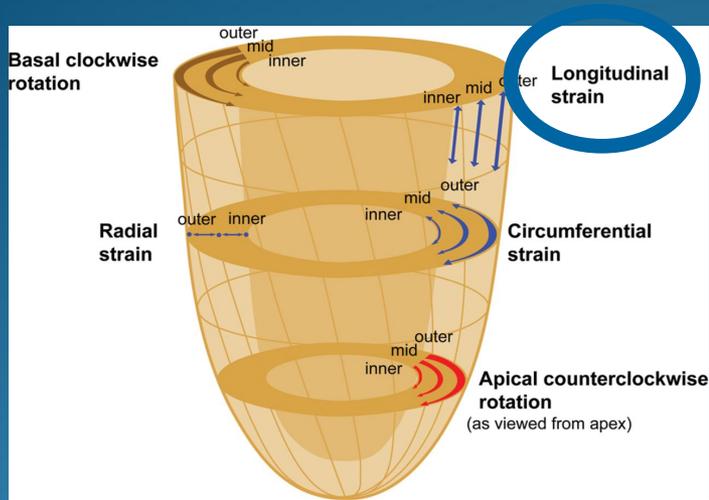


Chan J JACC 2006

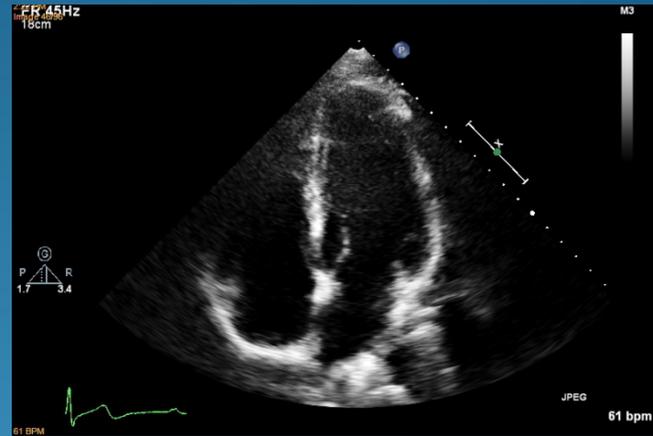
Come si fa?



ACQUISIZIONE DELLE IMMAGINI



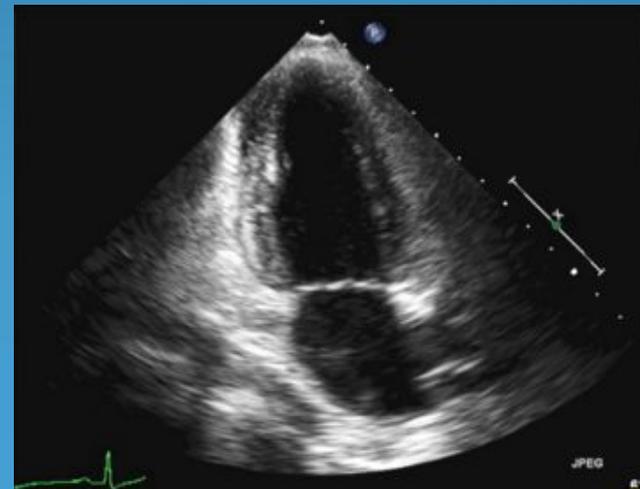
Apicale 4 camere



Apicale 3 camere

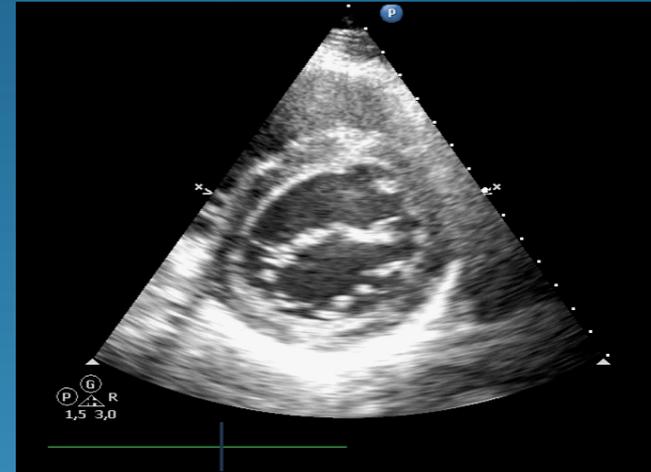
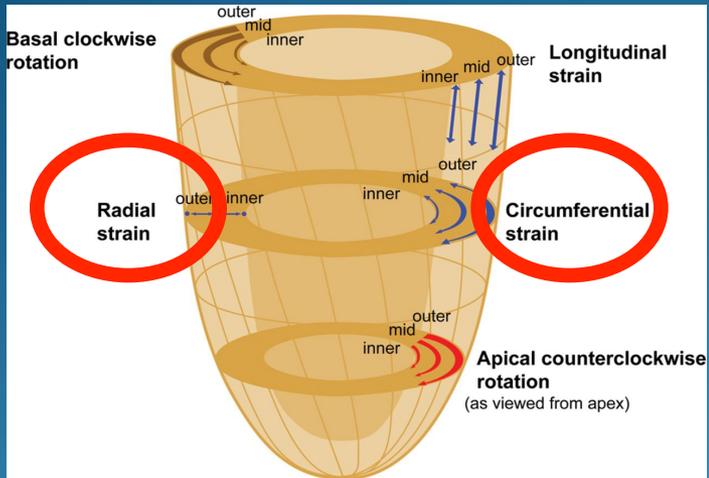


Apicale 2 camere

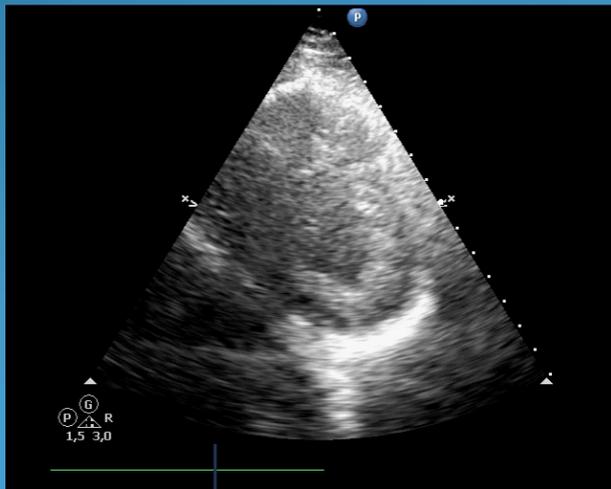


ACQUISIZIONE DELLE IMMAGINI

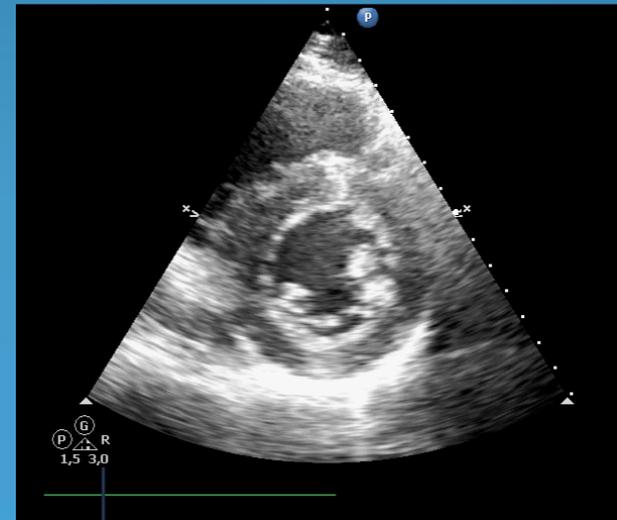
Parasternale asse corto basale



Parasternale asse corto apicale



Parasternale asse corto medio



ACQUISIZIONE DELLE IMMAGINI

Ottimizzare
il GAIN

Ridurre la
profondità
e l'angolo

Paziente in
apnea

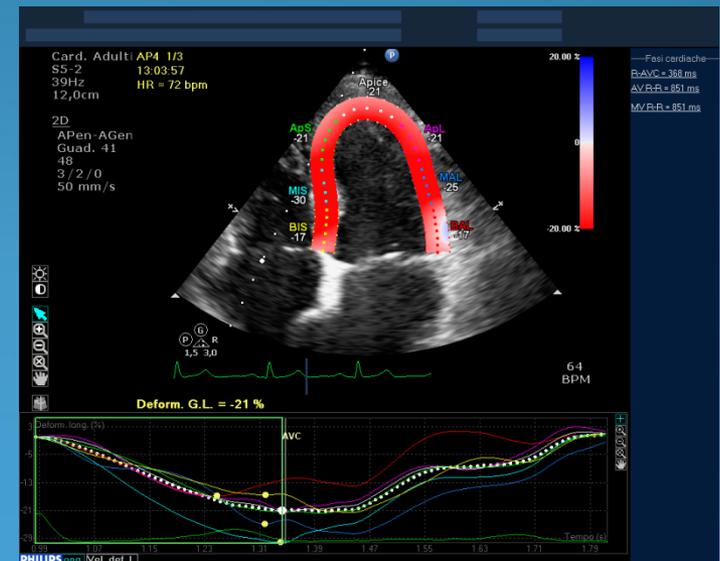
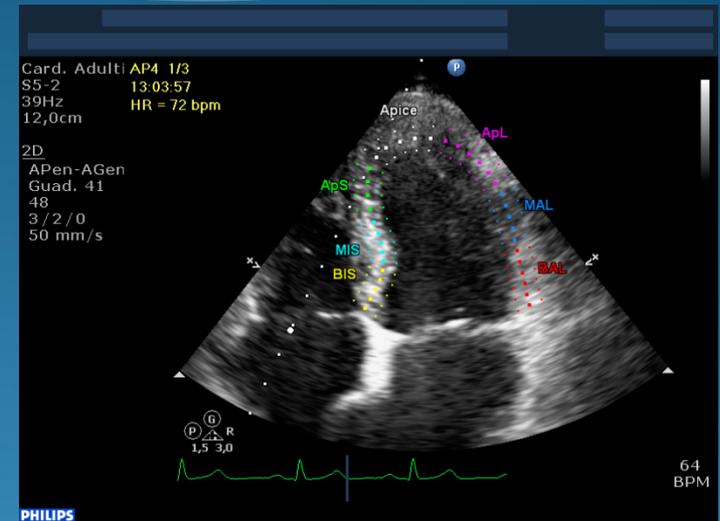
QUALITA'

Evitare il
foreshortening

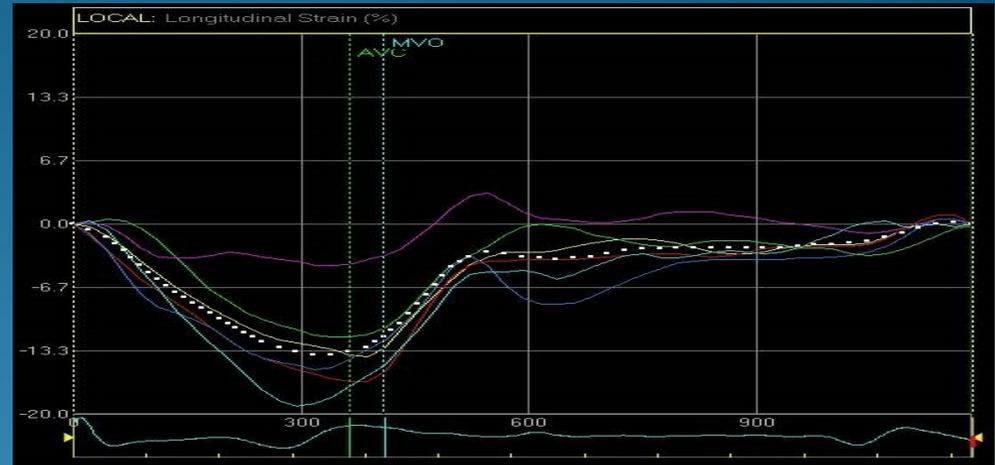
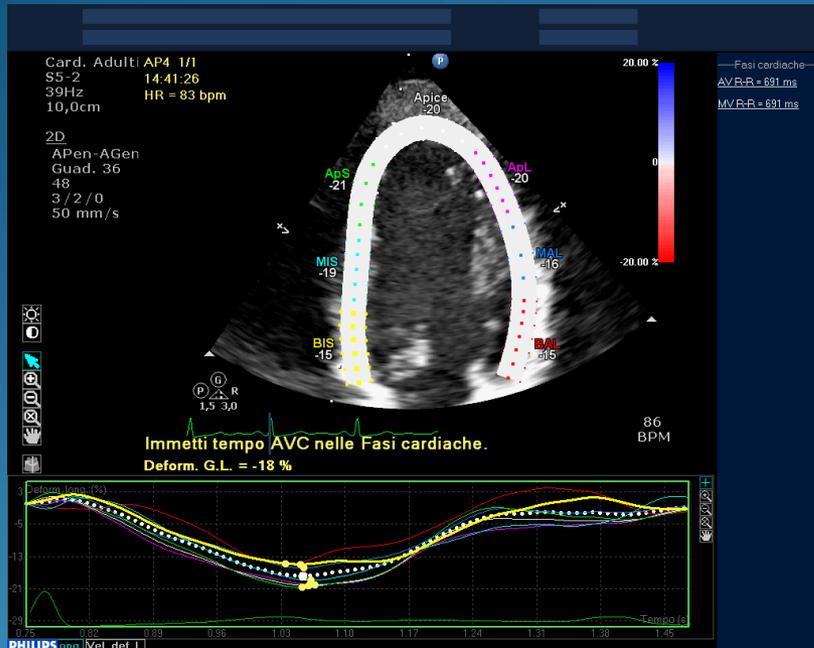
Indispensabile la
traccia ECG

ANALISI DELLE IMMAGINI

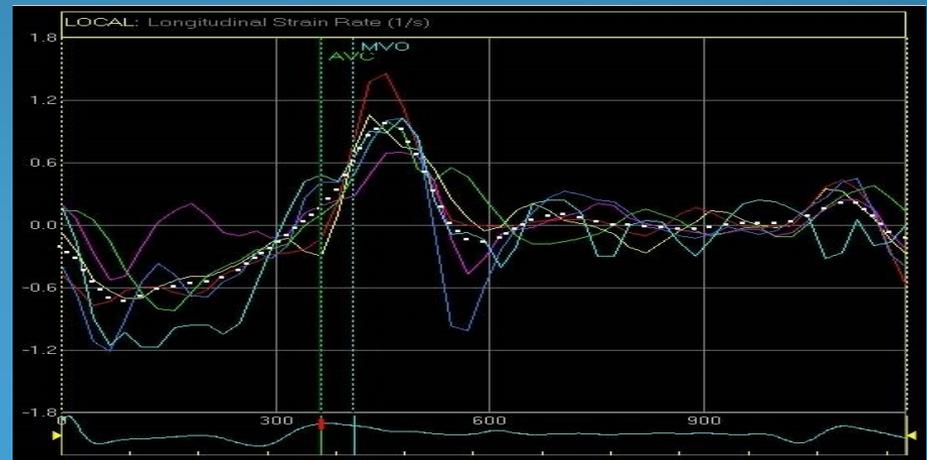
- In TELESISTOLE viene tracciato il bordo endocardico
- Il software automaticamente esegue il tracking e individua i vari segmenti
- L'operatore può modificare oppure approvare la ROI
- Il software analizza l'intero ciclo cardiaco e genera i risultati



VISUALIZZAZIONE DEI RISULTATI

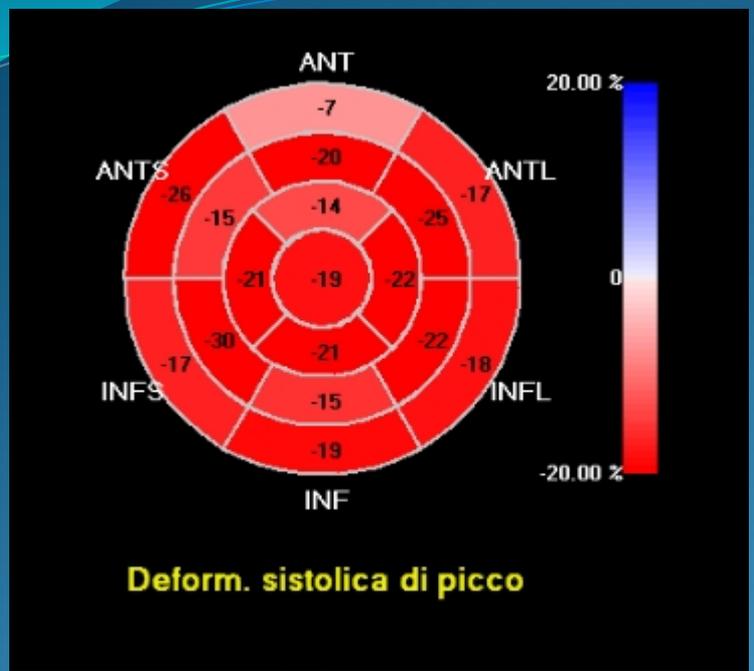


Curve di strain



Curve di strain rate

VISUALIZZAZIONE DEI RISULTATI

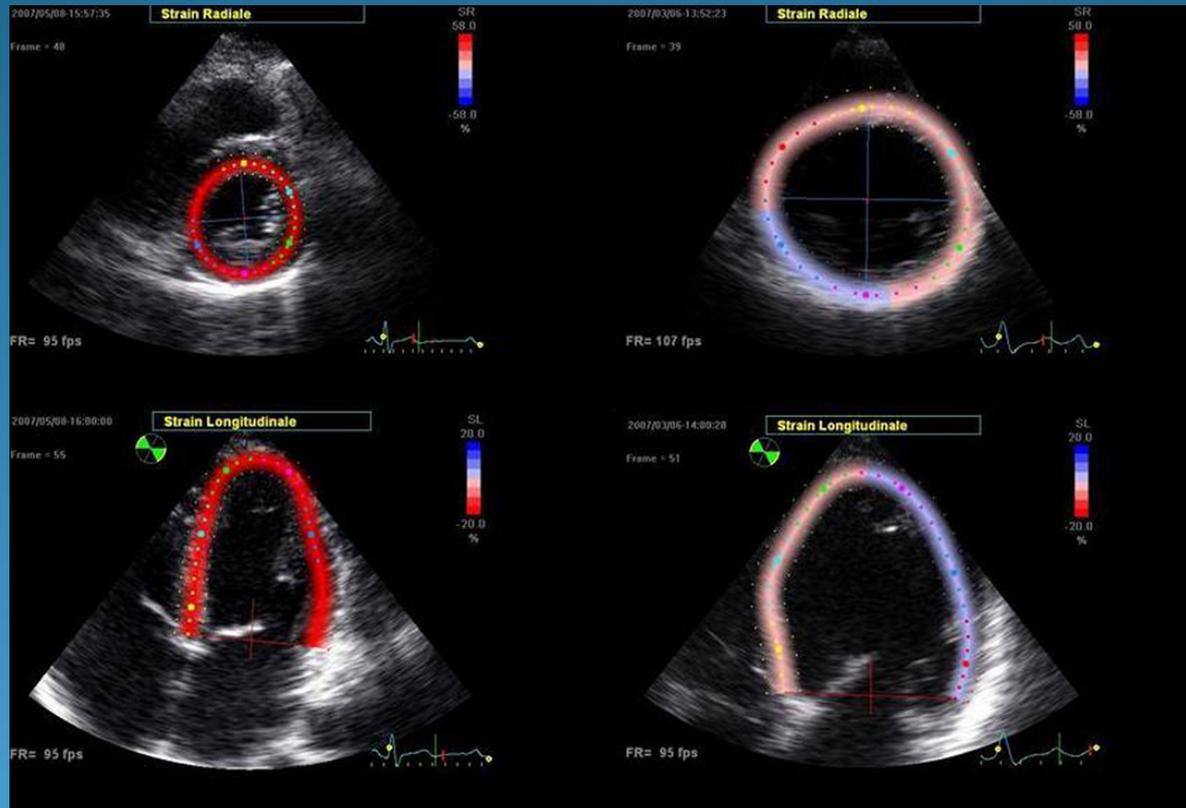


Bull' s Eye



Vettori

VISUALIZZAZIONE DEI RISULTATI



APPLICAZIONI CLINICHE

Valutazione dissincronie

Cardiopatía ischemica (stress tests, studi vitalità)

Individuazione di disfunzione miocardica subclinica

Valvulopatie

Valutazione ventricolare destra e atriale

LIMITAZIONI

**Qualità delle immagini/accuratezza
del tracking**

Necessità di ritmo sinusale

**Mancanza di uniformità di software e
terminologia**

CONCLUSIONI



CONCLUSIONI

STRAIN -> 2D SPECKLE = rapido, semplice e riproducibile

LG EUROPEE -> Chamber Quantification 20

GLS -> Utilizzabile e raccomandato

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, although measurements vary among vendors and software versions. To provide some guidance, a peak GLS in the range of -20% can be expected in a healthy person, and the lower the absolute value of strain is below this value, the more likely it is to be abnormal.

Global Longitudinal Strain.

Peak value of 2D longitudinal speckle tracking derived strain (%).



- Angle independent
- Established prognostic value

- Vendor dependent

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

Roberto M. Lang, MD, FASE, FESC, Luigi P. Badano, MD, PhD, FESC, Victor Mor-Avi, PhD, FASE, Jonathan Afilalo, MD, MSc, Anderson Armstrong, MD, MSc, Laura Ernande, MD, PhD, Frank A. Flachskampf, MD, FESC, Elyse Foster, MD, FASE, Steven A. Goldstein, MD, Tatiana Kuznetsova, MD, PhD, Patrizio Lancellotti, MD, PhD, FESC, Denisa Muraru, MD, PhD, Michael H. Picard, MD, FASE, Ernst R. Rietzschel, MD, PhD, Lawrence Rudski, MD, FASE, Kirk T. Spencer, MD, FASE, Wendy Tsang, MD, and Jens-Uwe Voigt, MD, PhD, FESC, *Chicago, Illinois; Padua, Italy; Montreal, Quebec and Toronto, Ontario, Canada; Baltimore, Maryland; Créteil, France; Uppsala, Sweden; San Francisco, California; Washington, District of Columbia; Leuven, Liège, and Ghent, Belgium; Boston, Massachusetts*

CONCLUSIONI

Attualmente la più grande limitazione di questa metodica è l'ampia variabilità di software, terminologia e risultati tra una marca e l'altra.

Supplemental Table 6 Normal LV strain values from meta-analysis and individual recent publications using specific vendors' equipment and software

| vendor | Software | n | Mean | SD | LLN | Reference |
|----------|-----------------|------|---------|------|-------|-----------|
| Varying | Meta-analysis | 2597 | -19.7 % | | NA | 26 |
| GE | EchoPAC BT 12 | 247 | -21.5 % | 2.0% | -18 % | 31 |
| | EchoPAC BT 12 | 207 | -21.2 % | 1.6% | -18 % | * |
| | EchoPAC BT 12 | 131 | -21.2 % | 2.4% | -17 % | † |
| | EchoPAC 110.1.3 | 333 | -21.3 % | 2.1% | -17 % | 32 |
| Phillips | QLAB 7.1 | 330 | -18.9 % | 2.5% | -14 % | 32 |
| Toshiba | Ultra Extend | 337 | -19.9 % | 2.4% | -15 % | 32 |
| Siemens | WI | 116 | -19.8 | 4.6 | -11 % | 197 |
| | WI | 82 | -17.3 | 2.3 | -13 % | 198 |
| Esote | Mylab 50 | 30 | -19.5 | 3.1 | -13 % | 199 |

LLN, Lower limit of normal range.

*T. Koznetsova and J. Staessen, Department of Cardiology, Catholic University Leuven, personal communication.

†P. Barbier, University Milano, personal communication.

Definitions for a Common Standard for 2D Speckle Tracking Echocardiography: Consensus Document of the EACVI/ASE/Industry Task Force to Standardize Deformation Imaging

Jens-Uwe Voigt,[†] Gianni Pedrizzetti,[†] Peter Lysyansky,[†] Tom H. Marwick, H el ene Houle, Rolf Baumann, Stefano Pedri, Yasuhiro Ito, Yasuhiko Abe, Stephen Metz, Joo Hyun Song, Jamie Hamilton, Partho P. Sengupta, Theodore J. Kolas, Jan d'Hooge, Gerard P. Aurigemma, James D. Thomas,[†] and Luigi Paolo Badano,[†] *Leuven, Belgium; Trieste, Genova, and Padova, Italy; New York, New York; Haifa, Israel; Hobart, Australia; Mountain View, California; Unterschleissheim, Germany; Tokyo and Tochigi-ken, Japan; Andover and Worcester, Massachusetts; Seoul, Korea; Ann Arbor, Michigan; and Cleveland, Ohio*

Grazie per l'attenzione