

Voluson E 10 Radiance: A Volume Ultrasound Scanner—A Scanner with a Difference

Sonal Panchal¹

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About the Reviewer



Dr. Sonal Panchal specializes in 3D–4D ultrasound in Infertility, Gynecology & Obstetrics at Dr. Nagori's Institute for Infertility and IVF, Ahmedabad. She is a Professor at Dubrovnik International University and National Academic Director of Ian Donald school, India. Her center is also recognized as a center of excellence by Ian Donald International University School of Ultrasound. She has done pioneering work on the role of Doppler and 3D–4D ultrasound in infertility. She has contributed in several books and published several papers on the subject. She has also authored and co-edited several books. The most popular ones are 'Handbook of Infertility and Ultrasound for a Practicing Gynecologist' and 'Ultrasound in Infertility and Gynecology—Text and Atlas'. Dr. Sonal is a peer reviewer for several national journals. She is a very popular and able teacher and holds several training programs at her center for Indian and foreign doctors for Doppler and 3D–4D ultrasound in Infertility, Gynecology & Obstetrics. She is presently engaged in a very innovative study on fetal neurobehaviour.

A new era in ultrasound commenced with the innovation of volume of volume (3D) technology in ultrasound. But the development and progress were very fast after the innovation of 4D ultrasound which is actually a real-time 3D ultrasound. It brought in several new softwares for volume assessments and blood flow assessments making it possible to actually study the body parts entirely, their tissue configuration and the blood flows. This was because of a high-pace development in computer technology.

In spite of considerable increase in the frame rate from 4 to 64 per minute, this still was not satisfactory, especially when large volumes were acquired. This is because with

the larger volumes these frame rates were difficult to achieve. Because the probes used for volume acquisition were mechanical volume probes in which the transducer used to move mechanically from one side to other side. This was a major limiting factor. Moreover, because of the mechanical volume acquisition, there was also a limitation on the number of B-mode frames included in any volume acquired. This had a strong negative impact on the reconstruction of the planes orthogonal to the acquisition plane. Though spatiotemporal imaging correlation (STIC) had made fetal heart assessment much convenient, the above-mentioned low frame rate and poor reconstruction of orthogonal planes were major limiting factors. Apart from the speed and resolution, there was still a drawback and this was that the surfaces on the rendering lines were seen well but looking through the tissue block was not possible due to lack of transparency.

Voluson E 10, Wipro GE Healthcare Private Limited, came in with a solution to all these drawbacks at a time. Introduction of transparency mode to the volume

Dr. Sonal Panchal is a Consultant Radiologist.

✉ Sonal Panchal
sonalyogesh@yahoo.com

¹ Dr. Nagori's Institute for Infertility and IVF, 2nd floor, Kedar, Nr Parimal Garden, Ahmedabad 380006, India

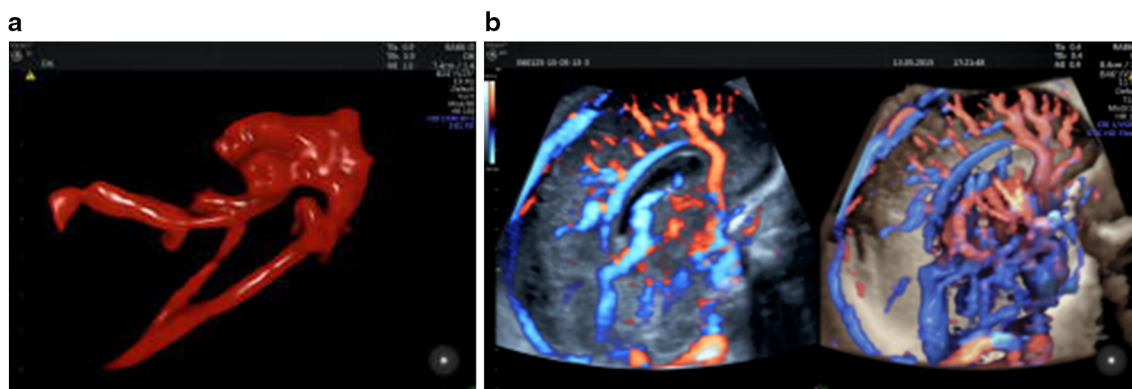


Fig. 1 **a** Fetal vasculature. **b** Fetal cerebral vasculature, sonorender live: automated detection of fluid borders to remove excess tissue. Apply to static 3D images or continuously update during 4D imaging

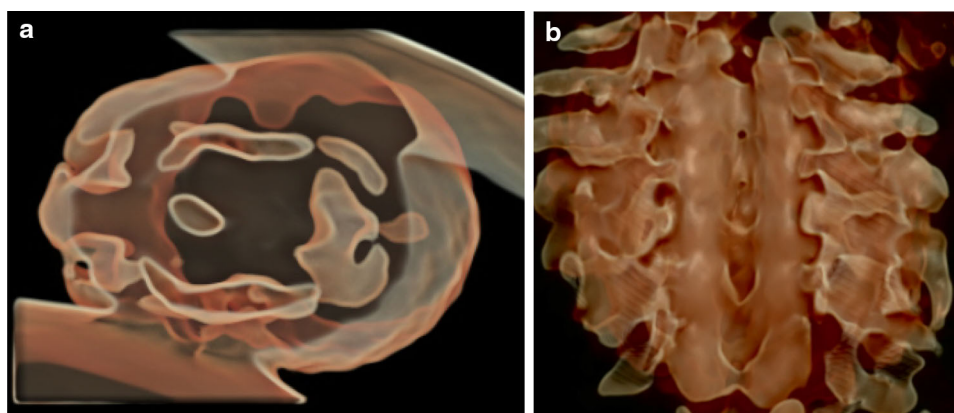


Fig. 2 **a** 10-week fetal head rendered with silhouette shows ventricular system and orbits. **b** Fetal spine rendered with silhouette, figure

ultrasound was a new landmark in the technology advancement. Voluson E 10 comes with a matrix convex probe. This is an electronic matrix probe with 8000 crystals. Electronic volume acquisition is much faster than the mechanical volume probe and therefore has a very high speed. Electronic 4D imaging is a major advance in 4D ultrasound overcoming many limitations of mechanical 3D/4D imaging technologies. It also has large array aperture and that is essential for better resolution of the images acquired. Its curved design allows larger field of view. It can transfer 10 times more data, has 4 times more processing power and four times more ultrasound pathways that improves penetration and resolution.

This is especially very useful for assessment of the heart by STIC. Because of gross (75 %) reduction in acquisition time of the volume, the acquisition plane clarity is evidently better. Along with that, it enables ability to image the orthogonal plane also with high frame rate and high resolution.

It has a high sensitivity of color Doppler. This allows fantastic depiction of fetal cardiac as well as other vessels.

Three-dimensional HD live flow gives an absolute realistic imaging of the vessels as well as cardiac flows. This is further enhanced by the unique selective electronic scalpel that it has. This makes it a unique tool for confident diagnosis of fetal cardiac as well as vascular abnormalities (Fig. 1).

Rendering of soft tissue and fetal bones also has a unique transparency mode called silhouette. Silhouette control provides user control of tissue display. When silhouette is increased to higher levels, it shows more internal structures, and when it is low, it shows more external structures of the same volume acquired. Though the applications of this mode are still evolving, it has been found to be of great use for assessment of early development of neural tube, assessment of heart, fluid-filled structures in the body, establishing amnionity of the multifetal pregnancies and also for assessment of fetal skeleton, especially the spine (Fig. 2).

Apart from this, of course many features like SonoIT, SonoNT, SonoAVC, SonoVCAD heart, SonoVCAD labor,

further decrease the scanning time and improve the work flow. These make Voluson E 10 Radiance a perfect combination of increased efficiency and smooth work flow.

Compliance with Ethical Standards

Conflict of interest None.