



White paper

Auto Flash Artifact Suppression

ACUSON Redwood ultrasound system

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Auto Flash Artifact Suppression

Reducing variability among users, improved image quality and workflow

The implications of patient and transducer motion in ultrasound, are significant. Up to 40% of abdominal ultrasound scans are repeat scans. Of those, 14% require additional follow-up exams, which may cost up to 8 billion dollars in additional tests*. Image quality is a foremost concern, since even modest amounts of motion may be sufficient to reduce clinical confidence, resulting in longer scan times, increased key strokes/reach and repeat scans. All of these concerns can impact departmental efficiency as well as patient and referring physician satisfaction.

Overview

High-performance ultrasound systems use sophisticated algorithms that make use of temporal information to improve image quality and blood flow detection. Such technologies, however, are highly sensitive to motion. Based on the type of motion, clinicians often try several different workarounds:

- To accommodate for patient respiratory motion, clinicians often ask patients to hold their breath, which may not be practical for pediatric and/or very ill patients.
- Due to involuntary cardiac motion, the clinician may choose to angle or reposition the transducer to a different scan window further away from the heart to avoid flash artifacts from cardiac motion. Such a window may not be optimal for diagnosis. Alternatively, the clinician may manually reduce the color Doppler sensitivity to a level that helps to avoid flash artifacts; by doing so, they risk not detecting the blood flow of interest.
- During initial scanning assessment, clinicians constantly reposition the transducer to different anatomical windows in search of targets, causing temporal artifacts to occur. As a result, the clinician will either move very slowly or manually reduce system sensitivity while searching; and then, manually restore system sensitivity when the search is complete.

In each of these cases, workflow is disrupted, efficiency is reduced and the opportunity for user variability increases. In some cases, the clinician might temporarily or permanently preset the system to reduce or disable the image enhancing technologies in order to avoid motion artifacts, thereby reducing image quality and clinical confidence.



These challenges can be overcome with intelligent, integrated technologies that enable automatic correction for patient or transducer motion.

Auto Flash Artifact Suppression on the ACUSON Redwood allows high-quality imaging without additional workflow steps – designed to improve imaging consistency and reduce unwarranted variability. Moreover, faster quality imaging can support higher levels of clinical confidence, faster triage in the ER, and better departmental and organizational efficiency.

Motion Detection

Auto Flash Artifact Suppression technology can automatically detect patient and transducer movement that may impact image quality. The typical ghosting appearance associated with B-mode and color Doppler from motion and transducer movement is prevented while enhancing color sensitivity and reducing B-mode noise when no motion is detected.

When the system detects motion, it gradually and automatically reduces persistence, which limits smearing or ghosting of images. When the motion stops, the system automatically restores itself to conventional image processing, which maintains the original image integrity. In this way, clinicians achieve the highest possible levels of image quality without additional steps, potentially saving time and increasing efficiency.

Benefits of Auto Flash Artifact Suppression

Auto Flash Artifact Suppression eliminates the continual need to adjust sensitivity settings by automatically maintaining the best color sensitivity when little motion is detected. As motion increases, the degree of suppression automatically increases proportionally to provide an artifact-free image.

Auto Flash Artifact Suppression is a **Siemens Healthineers proprietary technology** that detects and prevents artifacts associated with transducer and patient motion and enhances color imaging sensitivity when no motion is detected. It is integrated into the platform architecture of the ACUSON Redwood system and, as such, can support higher image quality and greater diagnostic certainty without adding additional steps to the clinician's workflow.

Auto Flash Artifact Suppression enables the use of very low filter settings without showing motion artifacts in color Doppler.

Figure 1 vs. Figure 2: Color Doppler image of the same scan comparison with Auto Flash Artifact Suppression off (Fig. 1) and on (Fig. 2), when the sonographer is surveying the liver and kidney with noticeable color motion artifact.

Figure 3 vs. Figure 4: Comparison images of the pulmonary veins with Auto Flash Artifact Suppression off (Fig. 3) and on (Fig. 4). A noticeable reduction of motion artifact and less bleeding of the color Doppler into the surrounding tissue is demonstrated in the second image.

Conclusion

Auto Flash Artifact Suppression technology can detect and prevent color motion artifacts to reduce noise, while at the same time enhancing color sensitivity for improved image quality, reducing variability between users and improving workflow.

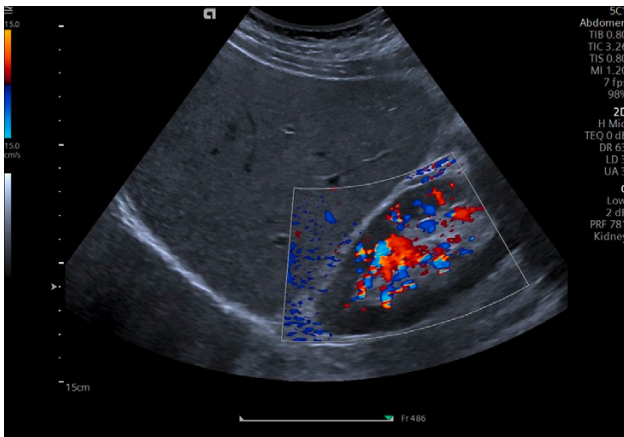


Figure 1: Conventional color Doppler image with motion artifacts.

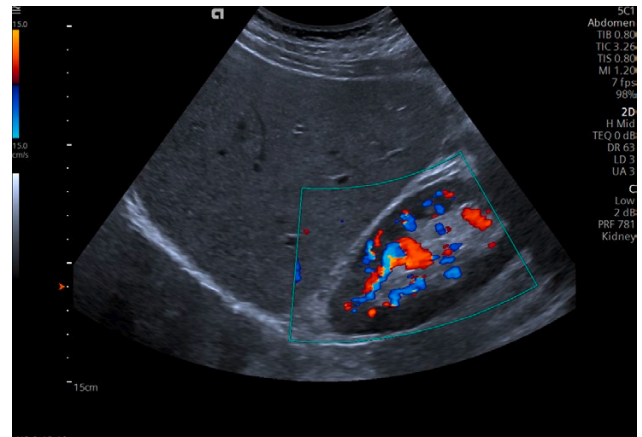


Figure 2: Color Doppler image with Auto Flash Artifact Suppression technology.

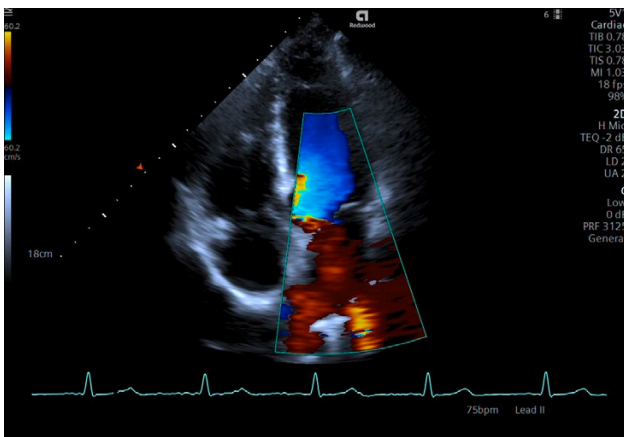


Figure 3: Conventional color Doppler image of the pulmonary veins with motion artifacts.



Figure 4: Color Doppler image of the pulmonary veins with Auto Flash Artifact Suppression technology.

References

Case Report

Kanal K, Bhargava P, Vaidya S, Dighe M. Ultrasound Artifacts Classification, Applied Physics with Illustrations, and Imaging Appearances. *Ultrasound Quarterly*. 2014 June;30(2):145-157.

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Auto Flash Artifact Suppression is Siemens Healthineers patented technology.

*Source

Repeat Abdominal Imaging Examinations in a Tertiary Care Hospital: Ivan K. Ip, MD, MPH,^{a,b} Koenraad J. Mortelet, MD,^{a,c} Luciano M. Prevedello, MD,^a and Ramin Khorasani, MD, MPH^a

Does radiologist recommendation for follow-up with the same imaging modality contribute substantially to high-cost imaging volume?: Lee SI1, Saokar A, Dreyer KJ, Weilburg JB, Thrall JH, Hahn PF

A 2009 Harvard School of Public Health report estimated that redundant laboratory studies amounted to 8.2% of all inpatient hospital costs in 2004, with redundant radiology tests accounting for a total of \$3.2 billion.

Source: Improving Safety And Eliminating Redundant Tests: Cutting Costs In U.S. Hospitals: Ashish K. Jha, David C. Chan, Abigail B. Ridgway, Calvin Franz and David W. Bates.

<https://www.nytimes.com/2016/09/26/health/obese-patients-health-care.html>

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