

# Efficient Image Quality Enhancements in Temporal Bone Imaging Using PROPELLER HD

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## Cholesteatoma and Diffusion-weighted Imaging

Cholesteatoma is a cystic lesion lined with keratin-producing squamous epithelium filled with desquamation debris in the middle ear. Patients with the disease are treated surgically, but the procedure carries the risk of residual cholesteatoma and tumor recurrence in a relatively high number of patients. CT has a high negative predictive value if no soft-tissue mass is detected. However, if a patient treated surgically has a soft-tissue mass, additional diagnosis with a CT study is not possible because cholesteatoma, granulation tissue and cholesterol granuloma cannot be differentiated from one another on CT.

MR imaging of the temporal bone can help in characterizing potential soft-tissue abnormalities shown on CT. Diffusion-weighted MR imaging (DWI) generates valuable information regarding diffusion motion of water protons in biologic tissue. DWI can also help confirm residual or recurrent cholesteatoma in patients who undergo middle ear surgery by showing a high-signal-intensity lesion. Other tissues found in the middle ear after surgery demonstrate a low signal intensity on diffusion-weighted MR images.

The PROPELLER HD™ sequence from GE Healthcare can be useful to detect recurrent cholesteatoma in patients post middle ear surgery and helps to minimize the numerous susceptibility artifacts that create high signal intensity in the air-bone interfaces or in the posterior fossa.



CT examination

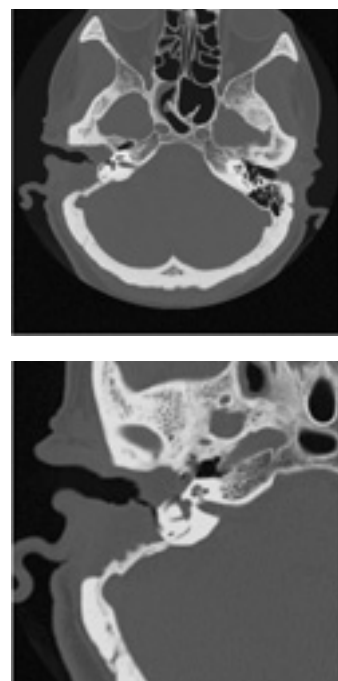


Figure 1.

## Clinical Case

An 80-year-old female underwent right middle ear surgery for cholesteatoma. A CT image shows a soft-tissue mass in the right middle ear. T1-weighted MR image post-contrast media injection depicts two lesions in the middle ear surgical cavity with peripheral granulation tissue. The DWI sequence demonstrates numerous susceptibility artifacts in the temporal bone.

## Findings

Image obtained on the same patient using the PROPELLER HD DWI sequence clearly demonstrates the high-signal intensity cholesteatoma (red arrow) and a cholesterol granuloma (green arrow).

## Conclusion

The PROPELLER HD sequence improves image quality in the vicinity of bone/tissue and air/tissue interfaces that are prone to creating susceptibility artifacts. PROPELLER HD DWI can suppress susceptibility artifacts, particularly helpful in temporal bone imaging to detect residual or recurrent cholesteatoma. ■

PROPELLER diffusion  
 B : 600 s /mm<sup>2</sup>  
 Sl. thickness 3.0mm  
 12 slices  
 Matrix 128X128  
 Acq. Time 03 :18  
 8 NVHEAD-A

### MR examination

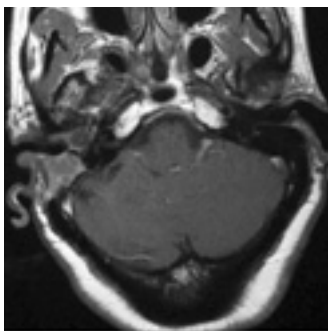


Figure 2. T1-weighted post-contrast MR image

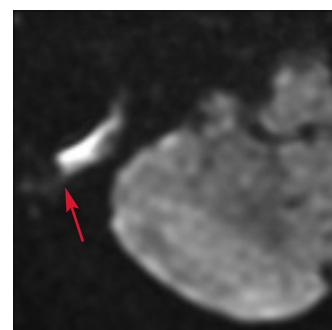
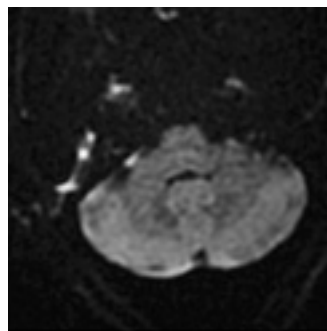


Figure 3. DWI-EPI

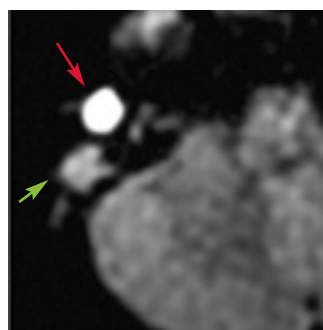
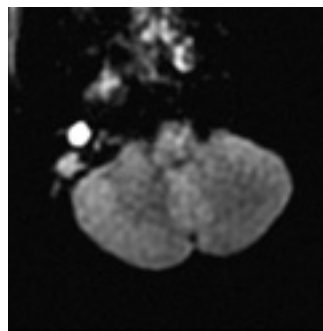


Figure 4. PROPELLER HD DWI



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Mathieu H. Rodallec, M.D., is a Senior Radiologist in MRI at Saint-Joseph Hospital in Paris, France, and board certified in Diagnostic Radiology. He received his medical degree from the School of Medicine of Paris, and fellowship training at Beaujon Hospital of the University of Paris VII. His interests include neuroradiology, head and neck radiology and musculoskeletal imaging. He has published training material, authored publications and abstracts and has given numerous presentations at educational meetings. He is a member of the French Society of Radiology (SFR), French Society of Neuroradiology (SFNR) and Radiological Society of North America (RSNA).

Saint-Joseph Hospital is a 746-bed, private, non-profit public service hospital. In January 2006, Saint Michel Hospital and Notre Dame de Bon Secours Hospital joined Saint-Joseph to form the Paris Saint-Joseph Hospital Group. Today, the three hospitals provide a full range of health services for patients south of Paris.

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