Redefining MRI:
From Image to Insight

ICMRI 2026
THE 14th INTERNATIONAL CONGRESS ON MRI
& 31st ANNUAL SCIENTIFIC MEETING OF KSMRM

AUGUST 27 - 28, 2026
Grand Walkerhill Seoul, Seoul, Korea
https://icmri.ksmrm.org/2026m

KSMRM Educational Course 1

교육세션 1-2

Biliary and Pancreas

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Magnetic resonance (MR) imaging, including MR cholangiopancreatography (MRCP), is now widely used for noninvasive evaluation of the biliary tree and pancreatic ductal system, reflecting recent technological advances.

Standard MRCP

Standard MRCP relies on heavily T2-weighted sequences that accentuate the high signal of relatively static fluid within the biliary tree and pancreatic duct while suppressing signal from background tissue and moving blood. It can be performed with rapid acquisition with relaxation enhancement (RARE) or its variants, including single-shot fast spin-echo, half-Fourier acquisition single-shot fast spin-echo, and fast-recovery fast spin-echo. Protocols generally combine two-dimensional (2D) and three-dimensional (3D) MRCP, which provide complementary information. 2D MRCP uses either a thick-slab single-section sequence or a thin-section multiecho sequence, both derived from single-shot RARE techniques that permit very short breath-hold acquisition. Respiratory-triggered 3D T2-weighted turbo-spin-echo RARE techniques enable isotropic voxel datasets with a spatial resolution of about 1.0 mm, and 3D MRCP can also be obtained with a fast-recovery 3D RARE sequence. Advantages of 3D over 2D include thinner sections without interslice gaps and postprocessing such as multiplanar reconstruction, maximum intensity projection, and volume rendering. However, ghosting and blurring artifacts are more conspicuous on 3D source images owing to longer acquisition times and variable respiration.

Contrast-enhanced MR cholangiography

MR cholangiography can also be performed with fat-saturated T1-weighted imaging using contrast agents excreted into bile. Gadoxetate disodium appears advantageous for biliary assessment; hepatobiliary phase images from routine gadoxetate disodium-enhanced liver MR obtained for focal hepatic lesions may serve as a “free” MR cholangiography for preoperative biliary mapping.

Parenchymal imaging of the pancreas

Unenhanced and dynamic gadolinium-enhanced T1-weighted gradient-echo sequences with fat suppression are best for evaluating the pancreatic parenchyma. On fat-suppressed T1-weighted images, the normal pancreas shows high signal intensity due to aqueous protein and manganese, and should appear homogeneous and at least equal to or greater than the liver in signal intensity. On T2-weighted images the pancreatic signal is variable but generally low to intermediate; turbo-spin-echo T2-weighted sequences help characterize peripancreatic inflammatory collections and distinguish solid from cystic lesions. Diffusion-weighted imaging (DWI) is an excellent adjunct to routine abdominal MR, potentially allowing earlier detection of pancreatic neoplasms and differentiation of solid from cystic lesions. Secretin-enhanced DWI may further help evaluate pancreatic exocrine function in chronic pancreatitis.

Keywords: *MR cholangiopancreatography (MRCP), Biliary tree, Pancreatic duct*