



# MRI

阿部祐也

# 今日のテーマ

- ▶ ルーチン検査
- ▶ 新しい検査（シーケンス）

# ルーチン検査

- ▶ 脳
- ▶ 脳ドック
- ▶ 頚椎・胸椎・腰椎
- ▶ 骨盤腔
- ▶ 肩関節
- ▶ 股関節
- ▶ 膝関節

# 新しい検査（シーケンス）

- ▶ 内耳（DRIVE）
- ▶ 心臓
- ▶ 乳房
- ▶ MRCP（BTFE）
- ▶ 肝プリモビスト
- ▶ 前立腺
- ▶ 脂肪抑制法（SPIR・SPAIR）

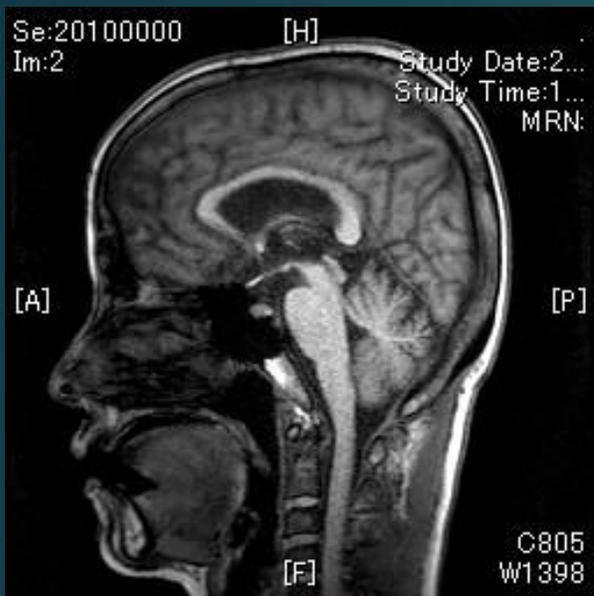
# ルーチン検査

# 脳

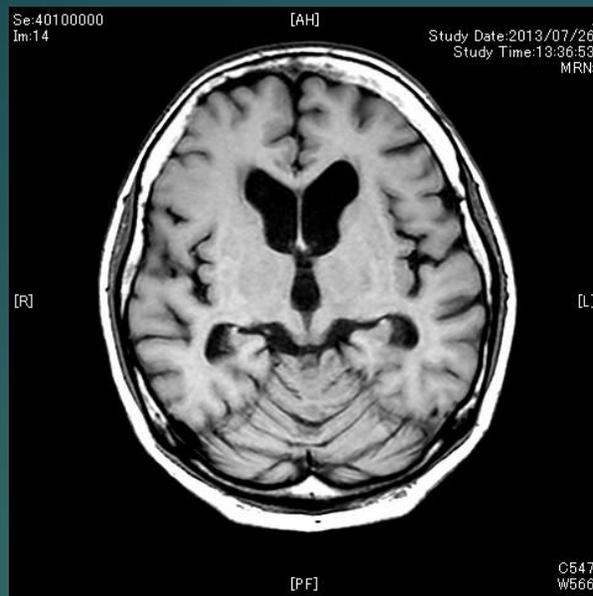
- ▶ Survey SAG
- ▶ T1W TRA
- ▶ T2W TRA
- ▶ FLAIR TRA
- ▶ DWI TRA (ADCmap)
- ▶ (MRA)

# DWIについて

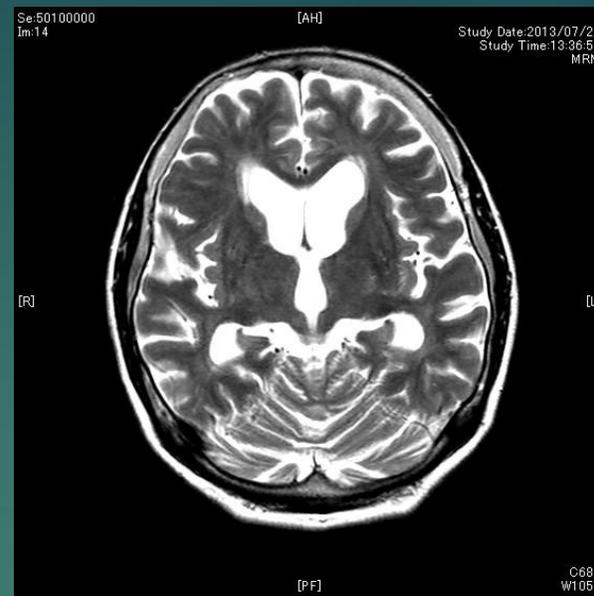
- ▶ 水分子の拡散運動を表す。
- ▶ 脳脊髄液など動きのある水分子は低信号。
- ▶ 急性期梗塞など水分子の動きが制限されている部位は高信号。
- ▶ T2Wに拡散強調用傾斜磁場を印加。
- ▶ b値・・・傾斜地場を印加する強さ。
  - b値が大きいほど拡散がより強調された画像になる。
  - b値 = 0 はT2W。
- ▶ ADC・・・見かけの拡散係数。二つ以上の異なるb値にて計算。
  - 拡散運動低下→ADC低下→ADCmap黒
  - T2Wで高信号なものがDWIでも高信号になることがあり
  - ADCmapでADC低下を確認。



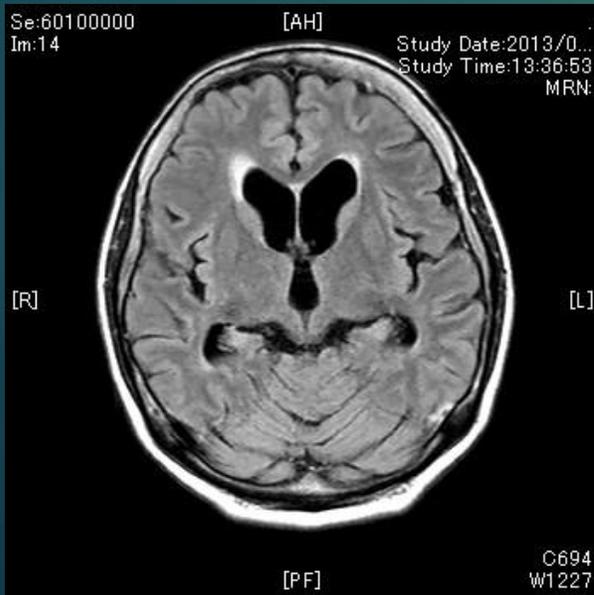
Survey SAG



T1W



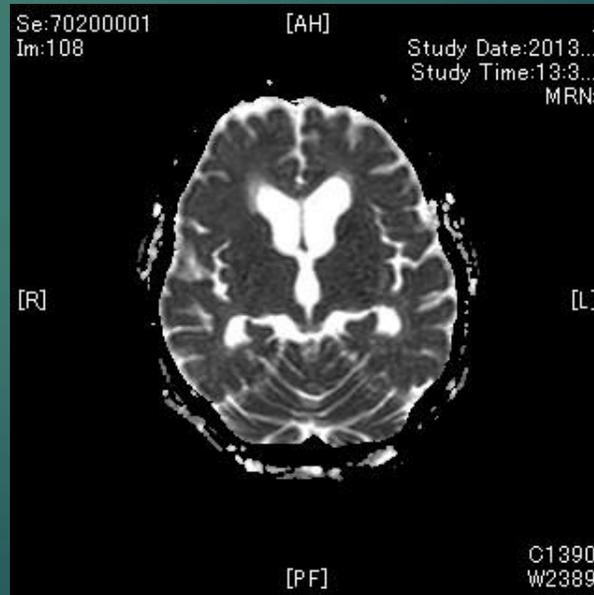
T2W



FLAIR



DWI



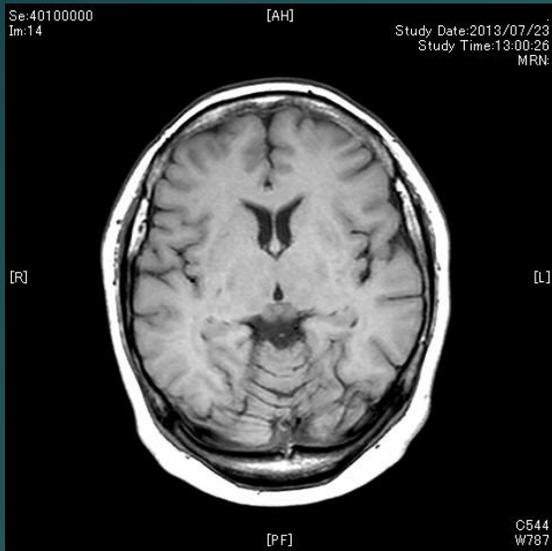
ADCmap



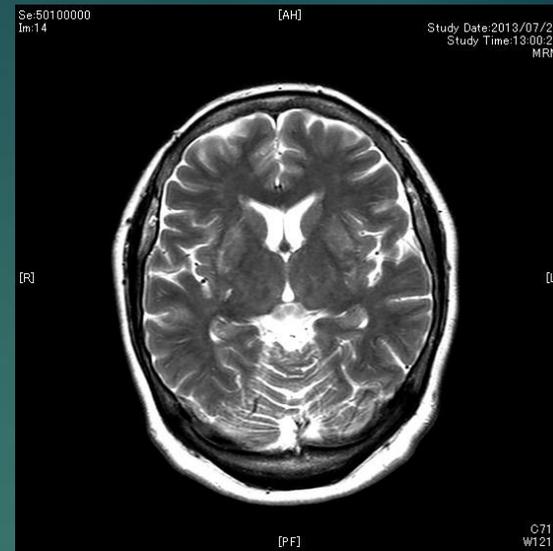
MRA

# 脳ドック

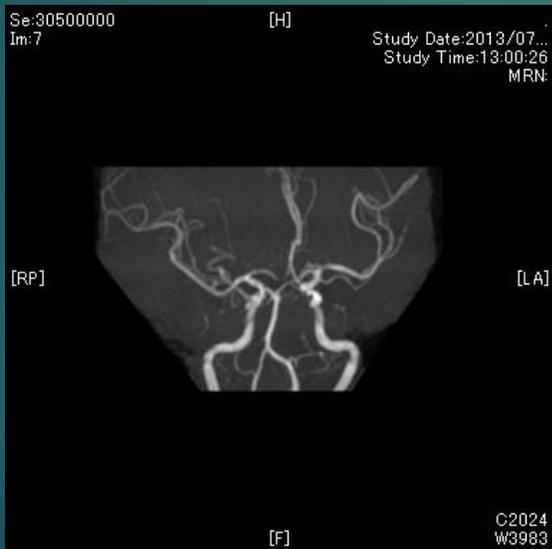
- ▶ MRA (HEAD)
- ▶ MRA (NECK+HEAD)
- ▶ T1W TRA
- ▶ T2W TRA



T1W



T2W



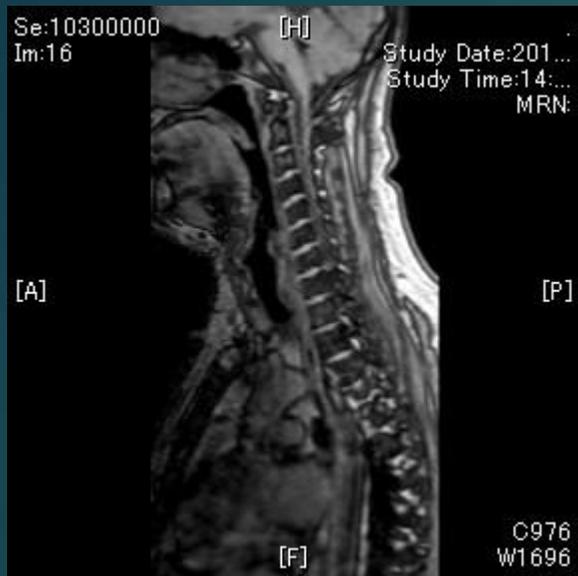
MRA



Neck MRA

# 頚椎・胸椎・腰椎

- ▶ T2W COR (胸椎のみナンバー付きSurvey SAG)
- ▶ T2W SAG
- ▶ T1W SAG
- ▶ T2W TRA
- ▶ T1W TRA



胸椎ナンバー付き  
Survey SAG



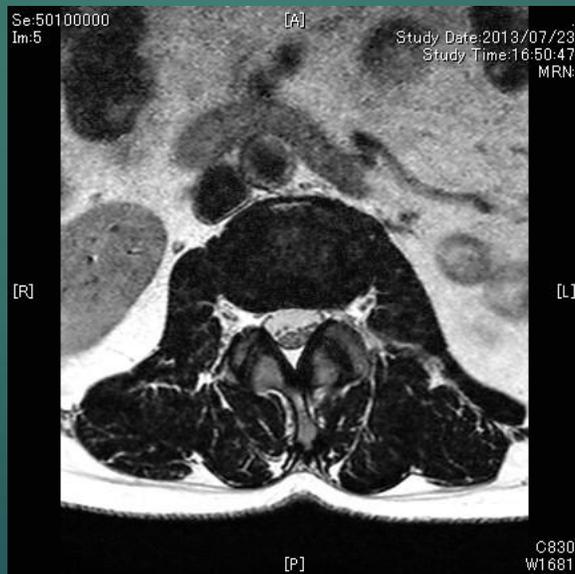
腰椎 T2W COR



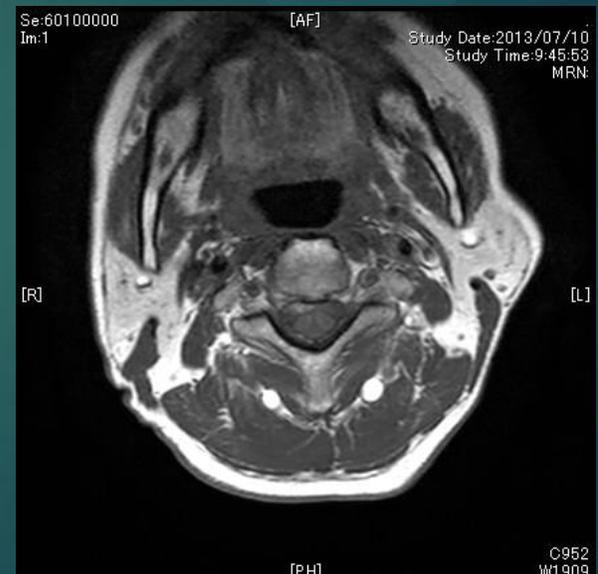
頸椎 T2W SAG



胸椎 T1W SAG



腰椎 T2W TRA



頸椎 T1W TRA

# 骨盤腔

- ▶ T2W SAG
- ▶ T2W COR
- ▶ T2W TRA
- ▶ T1W TRA
- ▶ T1W FatSat TRA
- ▶ (DWI TRA)



T2W SAG



T2W COR



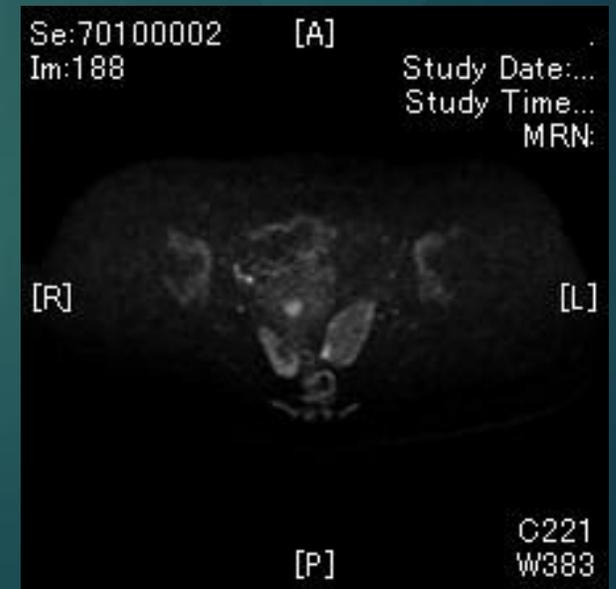
T2W TRA



T1W TRA



T1W FS TRA



DWI TRA

# 肩關節

- ▶ T2W TRA
- ▶ T2W SAG
- ▶ T2W COR
- ▶ T1W COR





T2W TRA



T2W SAG



T2W COR



T1W COR

# 膝關節

- ▶ T2\* TRA (T2W TRA)
- ▶ PDW SAG
- ▶ T2W SAG
- ▶ T2\* SAG
- ▶ RDW COR
- ▶ T2\* COR
- ▶ T2W FatSat COR



T2\* TRA



PDW SAG



T2W SAG



T2\* SAG



PDW COR



T2\* COR



T2W FS COR

# 股關節

- ▶ T1W COR
- ▶ T2W COR
- ▶ STIR COR
- ▶ T1W TRA
- ▶ T2W TRA
- ▶ STIR TRA



T1W COR



T2W COR



STIR COR



T1W TRA



T2W TRA



STIR TRA

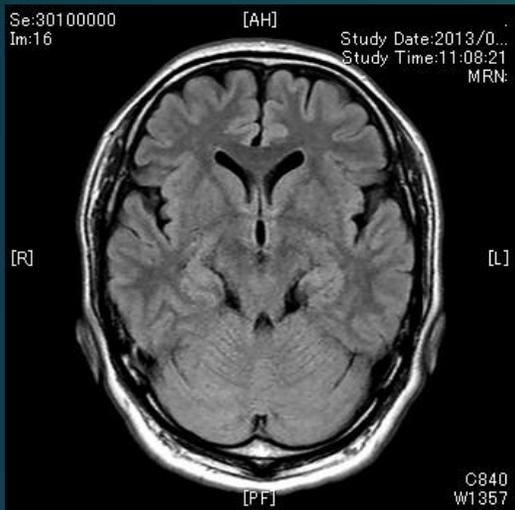
# 新しい検査（シーケンス）

# 内耳 (DRIVE)

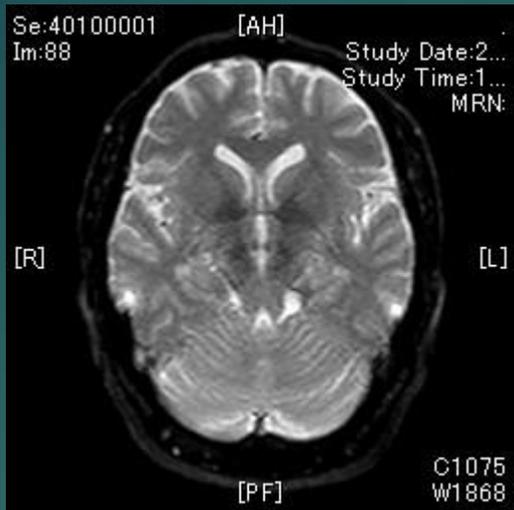
- ▶ 全脳 FLAIR TRA
- ▶ 全脳 DWI (b=0、1000) TRA
- ▶ IAC T2W TRA
- ▶ IAC T1W TRA
- ▶ IAC **DRIVE** TRA・COR

## ▶ DRIVE

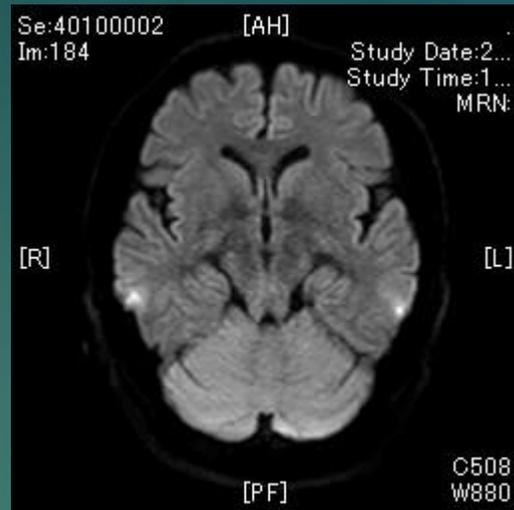
短いTRでT2Wを撮影する方法。短時間で3D撮像ができる。  
脳実質などのコントラストが低下する。



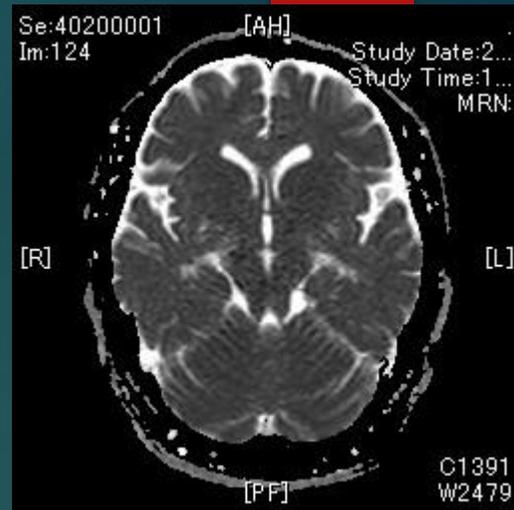
全脑FLAIR



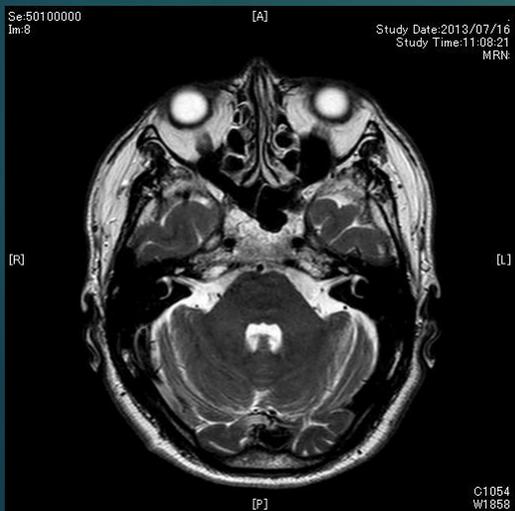
全脑DWI b=0



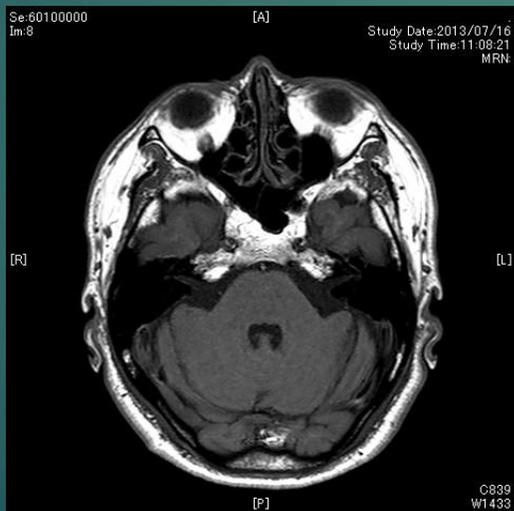
全脑DWI b=1000



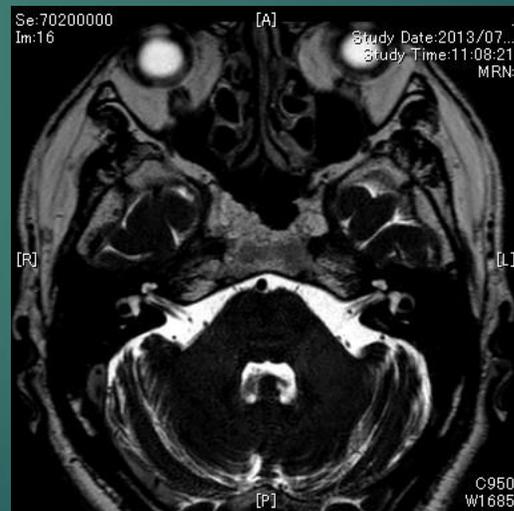
全脑ADC



内耳T2W



内耳T1W



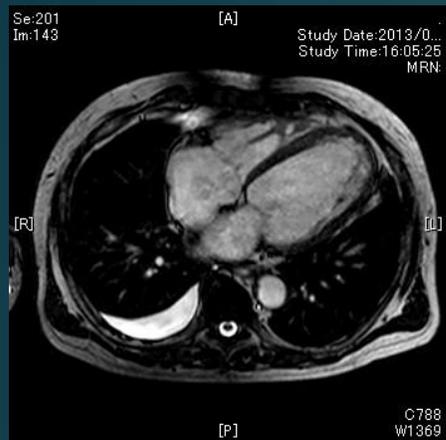
内耳DRIVE TRA



内耳DRIVE COR

# 心臟

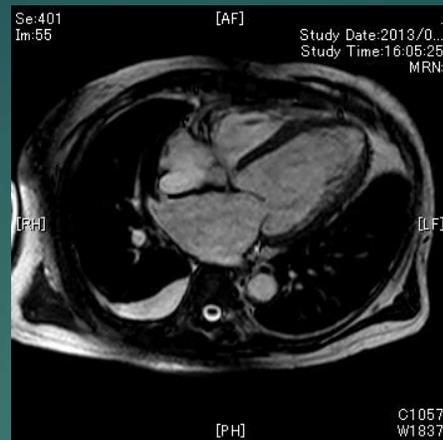
- ▶ CINE                    TRA · 2ch · n4ch · SA · 4ch
- ▶ T2W FS BB            SA
- ▶ 遲延造影            n2ch · 4ch · SA



CINE TRA



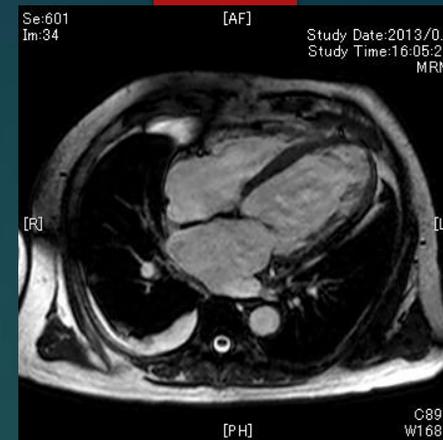
CINE 2ch



CINE n4ch



CINE SA



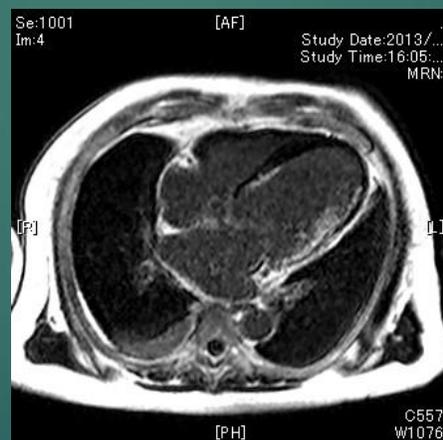
CINE 4ch



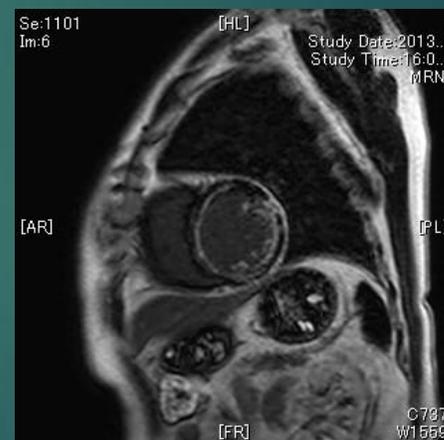
T2W FS BB SA



延迟造影 n2ch



延迟造影 4ch



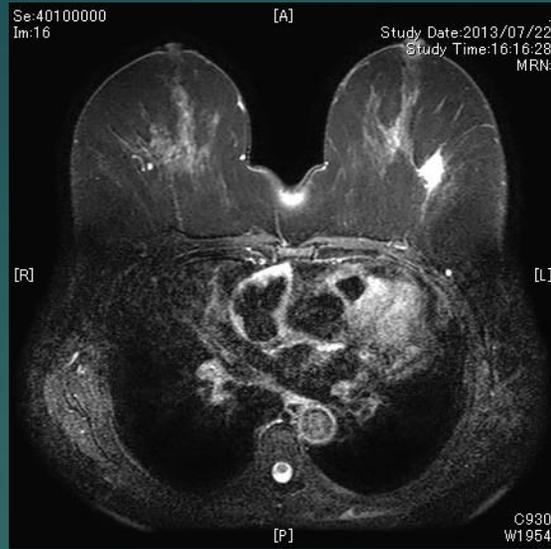
延迟造影 SA

# 乳房

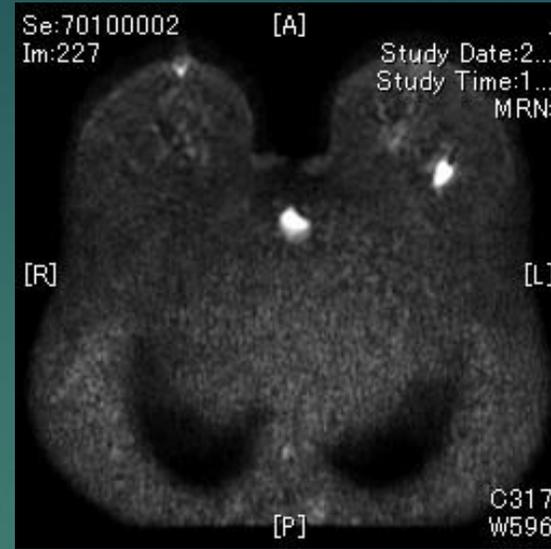
- ▶ T1W TRA
- ▶ T2W FatSat TRA
- ▶ DWI TRA
- ▶ Dynamic (Pre、1min、2min、5min) TRA
- ▶ Dynamic 1min MIP
- ▶ Dynamic 3min SAG
- ▶ Dynamic 3min MIP



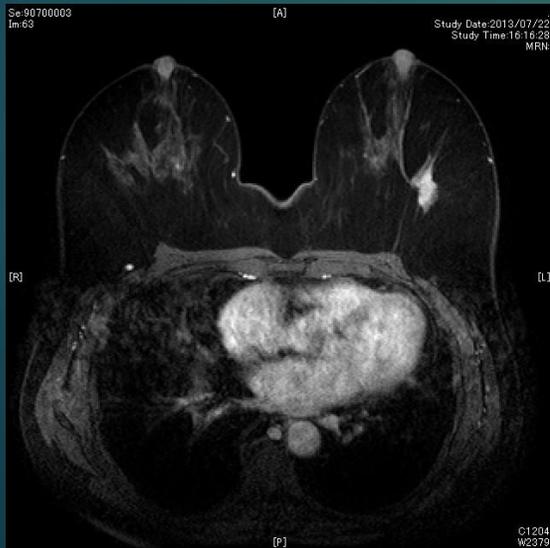
T1W



T2W FS



DWI



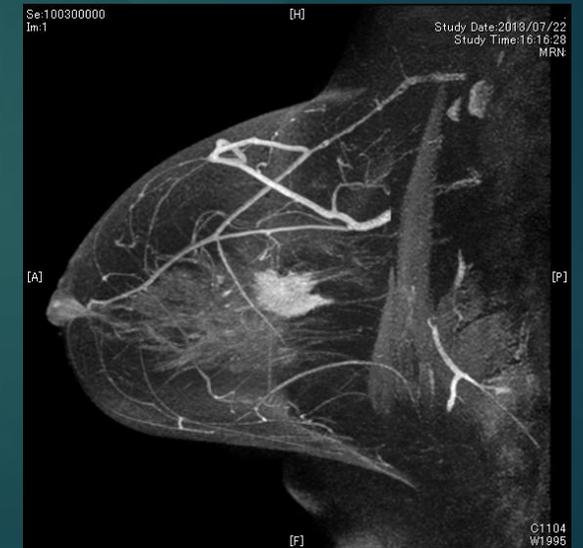
Dynamic × 3



Dynamic MIP



Dynamic SAG



Dynamic SAG MIP

# MRCP (BTFE)

- ▶ T1W (in phase、 out of phase) TRA
  - ▶ T2W TRA
  - ▶ T2W FatSat TRA
  - ▶ DWI TRA
  - ▶ MRCP 元画COR・MIP
  - ▶ **BTFE** COR
  - ▶ MRCP shingle shot× 5
- 
- ▶ BTFE (balanced turbo field-echo)  
連続するRFパルスで生成されるFID・SE・STEの全ての信号を同時に収集するシーケンス。  
3つの信号を収集するためSN比が高い。  
水っぽいものが高信号になる。



T1W in phase



T1W out of phase



T2W



T2W FS



MRCP MIP



MRCP MPR COR



BTFE COR



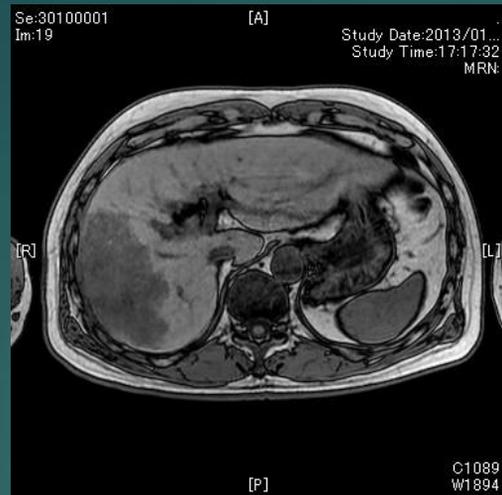
Shingle shot x 5

# 肝プリモビスト

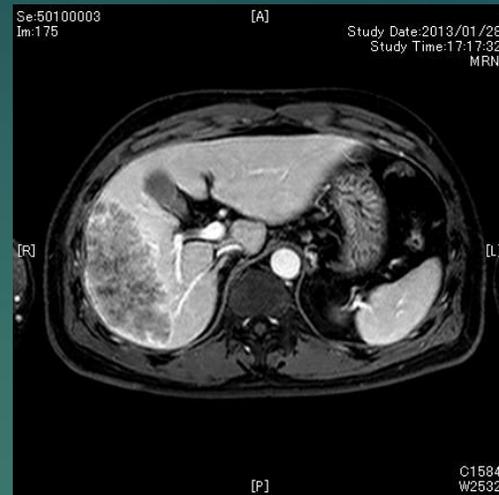
- ▶ T1W (in phase、 out of phase) TRA
- ▶ Dynamic (Pre、 30s、 60s、 150s) TRA
- ▶ T2W TRA
- ▶ T2W FatSat TRA
- ▶ DWI TRA
- ▶ Dynamic 20min(肝細胞相) TRA・COR



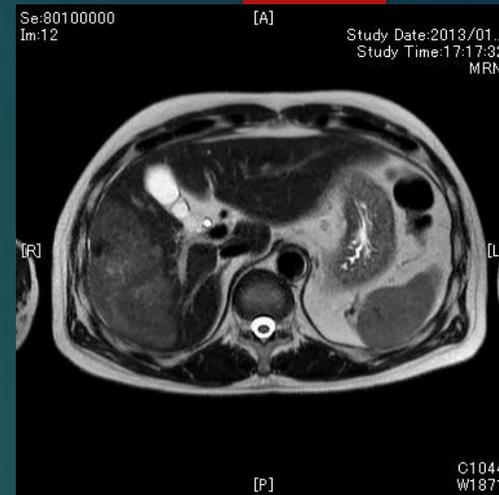
T1W in phase



T1W out of phase



Dynamic × 4



T2W



T2W FS



DWI



肝細胞相



肝細胞相 COR

# 前立腺

- ▶ T2W TRA
- ▶ T1W TRA
- ▶ DWI TRA
- ▶ T2W SAG
- ▶ T2W COR
- ▶ Dynamic (Pre、 1、 2、 3、 4、 5) TRA
- ▶ Gd TIW FS TRA



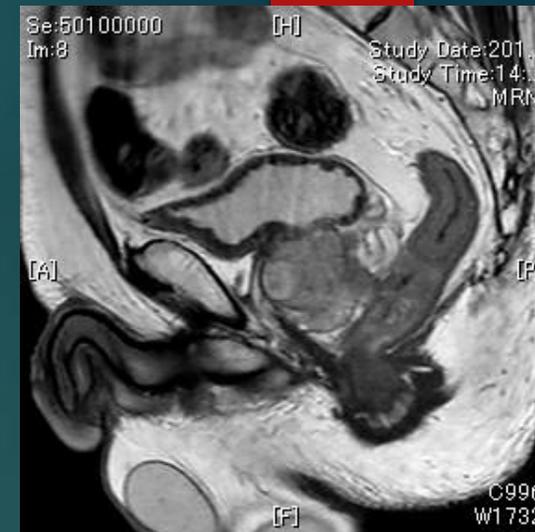
T2W TRA



T1W TRA



DWI TRA



T2W SAG



T2W COR



Dynamic x6



Gd delay T1W FS

# 脂肪抑制 (SPIR・SPAIR)

- ▶ SPIR・SPAIR共に選択的脂肪抑制法。
- ▶ 水と脂肪の周波数の違いを利用して脂肪の信号のみを抑制する。
- ▶ 脂肪の周波数にIRパルスを印加し、脂肪信号のT1緩和がnull pointに到達したタイミングで励起パルスを印加することで水信号のみが励起される。
- ▶ SPIR・・・100°～110°のIRパルス。
- ▶ SPAIR・・・180°のIRパルス。

脂肪抑制効果が高い。

SPIRよりT1が長いいため撮像時間が延長する。