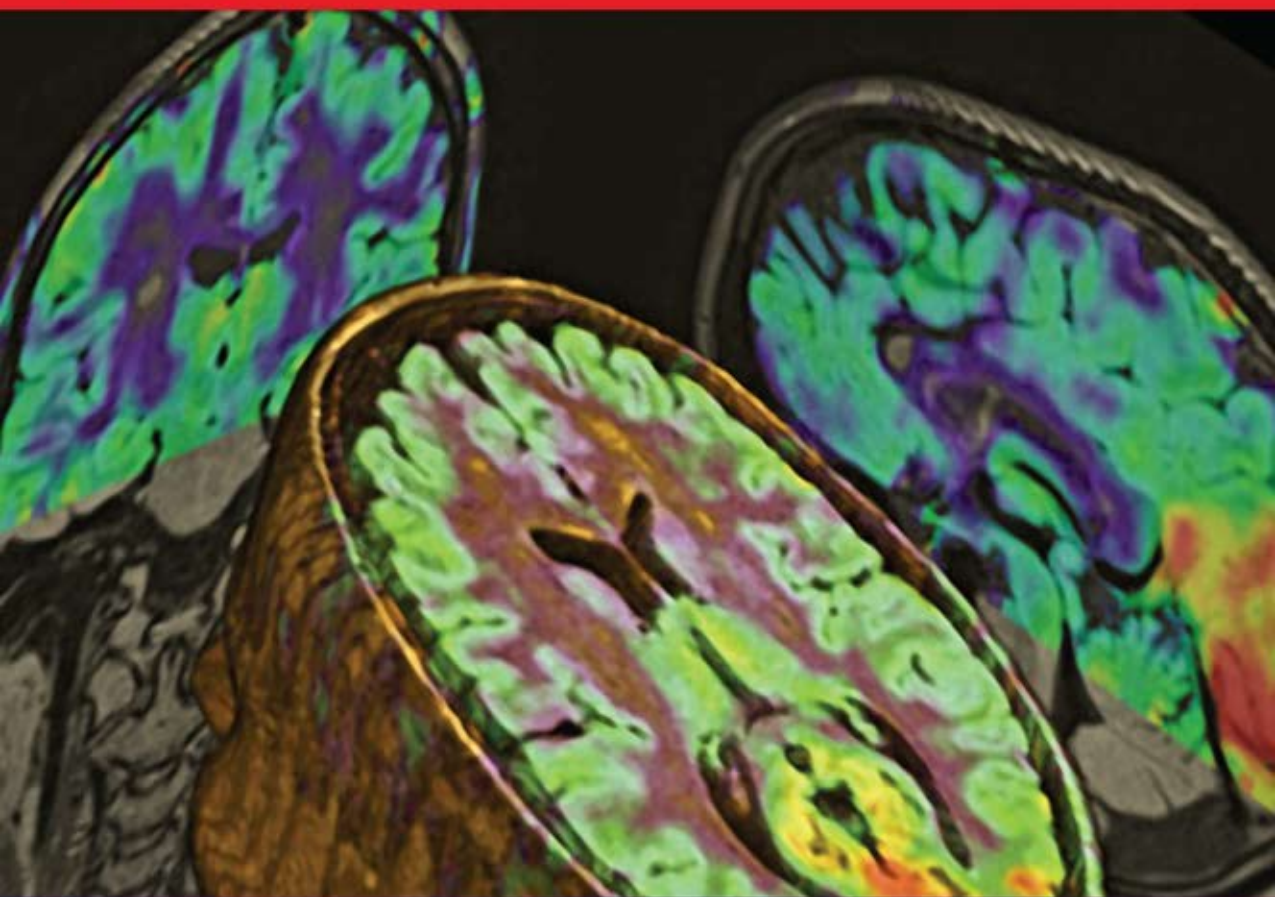




Δημήτρης Κουμαριανός



*Από τις Βασικές αρχές στην Κλινική πράξη*

# ΜΑΓΝΗΤΙΚΗ ΤΟΜΟΓΡΑΦΙΑ



Εκδόσεις Ζεβελεκάκη

(  $\mu$   $\mu$  ) . . . DWI ( )  
 $\mu$   $\mu$  ) 295  
 $\mu$  256  
 $\mu$  1  $\mu$  , 25  
 $\mu$  , 10, 316  $\mu$  353  
 (GE); . . . spin echo (SE) gradient echo . . . FID  
 $\mu\mu$  35, 73 2\* , 27, 57, 88 182  
 186, 52 10, 288, 322, 331  $\mu$  NEX , 93  
 288  $\mu$  SNR 241 219  
 $\mu$  345 214  
 $\mu$   $\mu$  144, 156 FSE 116, 120, 250  
 $\mu$   $\mu$  144 286  
 $\mu$   $\mu$  103 6. . . 10  
 $\mu$   $\mu$  FID. . . FID: . . .  
 $\mu$  FID . . . inversion recovery (IR)  
 64  $\mu$  8 327  
 5  
 215  
 215 navigator echo gating 218  
 respiratory compensation 217  
 $\mu$   $\mu$  215  
 95, 108, 117, 255, 283  
 voxel 239  
 13  
 $\mu$  3  
 $\mu$  27, 29, 34, 165  
 B1 169, 170, 285  
 11  
 11  
 14, 38, 246  
 DWI 293  
 EPI 275  
 $\mu$  38  
 $\mu$  38  
 58  
 286  
 - 92  
 TR 40  
 T 43  
 $\mu$  10  
 $\mu$  , 22, 19  
 $\mu$  256  
 $\mu$  FFT 86  
 82  
 $\mu$  83, 239  
 $\mu$   $\mu$  ) . . . PWI ( )  
 $\mu$   $\mu$  ) . . . SWI  
 DWI 294  
 GE 52  
 PDW , 15, 44  
 SE 49-64  
 1W , 15, 44  
 2\*W 57  
 2W , 15, 44  
 $\mu$  64  
 $\mu$  73, 75  
 $\mu$  11, 12  
 $\mu$  326  
 $\mu$  330  
 $\mu$  327  
 $\mu$  326  
 $\mu$  E 13  
 $\mu$  7  
 $\mu$  9, 330 5  
 16, 55, 62, 64, 287  
 204, 62  
 $\mu$  64  
 $\mu$  348  $\mu$  277

$\mu\mu$  323  
 $\mu$  20  
 Ernst 58, 138, 239  
 , 23, 58, 52, 138  
 SNR 238  
 $\mu$  153  
 $\mu$  156  
  
 $\mu$  77  
 $\mu$  55, 62, 306  
 $\mu$  296  
 $\mu\mu$   $\mu$  35, 73  
 10  
 $\mu$  , 55  
 $\mu$  185  
 $\mu$   $\mu$  , 20, 21  
 25  
 $\mu$  . . cross talk  
 , 292  
 292, 295  
 292, 295  
 $\mu$  . . stimulated echo (STE)  
 , 22  
 200  
 $\mu$   $\mu$  286  
 $\mu$  Eddy 325  
 184, 348  
 $\mu$   $\mu$  , 176, 170  
 $\mu$  205, 160  
  
 $\mu$  , 23, 21  
 25  
 $\mu$  142  
 $\mu$  12  
 , 214  
 magnitude 91  
 PD (PDW) 46  
 1 ( 1W) 46  
 2 (T2W) 44  
 198, 57, 91, 308  
 170, 288  
 $\mu$   $\mu$  171  
 $\mu$  170  
 $\mu$  70  
 $\mu$  167  
  
 $\mu$   $\mu$  12  
 176  
 $\mu$   $\mu$  12  
 12  
 $\mu$   $\mu$  12  
 $\mu$  11  
 $\mu$  12  
 $\mu$  12  
 $\mu$  185  
 $\mu$   $\mu$  2,8,246. .  $\mu$   
 $\mu$   
 $\mu$  16  
 4

Bloch 26  
 Larmor 20  
 $\mu$  , 166  
 317  
 317  
 62  
 31  
 MRA 212  
 66  
 - 104  
 $\mu$  108  
 $\mu$   $\mu$  65, 232  
 229  
 $\mu$  68  
 $\mu$  10  
 $\mu\mu$  202, 99, 83, 218  
 47  
 rBW , 88, 79, 120, 241, 277  
 SNR 241  
 $\mu$   $\mu$  225, 229  
 $\mu$  , 68  
  
 6, 10  
  
 13  
 $\mu$   
 3, 10, 316  
  
 63  
 111  
  
 $\mu$  19  
 328  
 $\mu$  9, 12, 25  
 $\mu$  67  
 $\mu$  Nyquist 78  
 237, 257  
 , 234, 317  
 317, 325  
 317  
  
 207, 65, 166, 322  
 295  
 voxel 239  
 $\mu$   $\mu$   
 $\mu$   $\mu$  16  
 $\mu$  305  
 $\mu$   $\mu$  299  
  
 $\mu$  1 25  
 $\mu$  2 26  
  
 $\mu$  11  
 $\mu$  196  
 $\mu$  330  
 $\mu$  218

$\mu$  12  
 128, 165, 288, 310  
 $\mu$  165  
 $\mu$  165  
 $\mu$  IR 128, 164  
 182  
 $\mu$  47  
 $\mu$  12  
 $\mu$  213  
 $\mu$  213  
 $\mu$  3, 12  
 Faraday 4  
 $\mu$  5  
 $\mu$  , 58, 52, 138, 237  
 $\mu$  12  
 $\mu$  , 3  
 , 84  
 profile order 101, 116  
 92  
 104  
 CE-MRA 202  
 $\mu$  85  
 $\mu\mu$  116  
 $\mu$  99  
 EPI 272  
 $\mu$  91  
 $\mu$  92  
 349  
 $\mu$  , 72  
 $\mu$  97  
 $\mu$  , 69, 221, 276  
 $\mu$  221  
 $\mu$  214  
 $\mu$  . .fMRI ( -  
 )  
 280  
 $\mu$  69, 75  
 $\mu$  72, 75  
 (CNR). .CNR (  
 )  
 $\mu$  (SNR). .SNR (  
 )  
 $\mu$  55, 63, 64  
 $\mu$  2, 314  
 $\mu$  3, 315  
 $\mu$  2, 315  
 $\mu$  327  
 $\mu$  2, 315  
 $\mu$  315  
 $\mu$  2, 316  
 $\mu$  (MRA) 191, 350  
 $\mu$  212  
 $\mu$  211  
 $\mu$  191  
 $\mu$  211  
 $\mu$  205  
 $\mu$  , 54, 301  
 $\mu$  287  
 $\mu$  (susceptibility) 230, 279  
 $\mu$  2, 283  
 $\mu$  SAR 284  
 $\mu$  288  
 $\mu$  286  
 $\mu$  B1 285  
 $\mu$  287  
 $\mu$  284  
 $\mu$  283  
 $\mu$  288  
 $\mu$  1  
 $\mu$  46  
 $\mu$  6  
 $\mu$  327  
 $\mu$  12  
 $\mu$  , 20, 21  
 $\mu$  323  
 $\mu$  255  
 $\mu$  55, 56, 62  
 $\mu$  voxel 185  
 $\mu$  95, 233, 249  
 $\mu$  ( ) 16, 60, 248  
 blood-pool 209  
 $\mu$  60  
 $\mu$  64  
 $\mu$  60  
 $\mu$  207, 62  
 $\mu$  63  
 $\mu$  63  
 $\mu$  201  
 $\mu$  11, 12  
 $\mu$  , 20  
 $\mu$  20  
 $\mu$  , 239  
 $\mu$  13  
 $\mu$  12  
 $\mu$  130, 137, 209, 274  
 $\mu$  95  
 $\mu$  12  
 $\mu$  Faraday 22  
 $\mu$  8  
 IEC 60601-2-33 326  
 $\mu$  167  
 $\mu$  2004/40 326  
 $\mu$  72  
 $\mu$  , 71

$\mu$  MRI 322  
 $\mu$  12  
 $\mu$  29 201  
 $\mu$  25  
 $\mu$  62, 306  
 $\mu$  10, 331  
 $\mu$  12  
 $\mu$  95, 255  
 $\mu$  180° 30  
 VERSE 329  
 $\mu$  126, 156, 168  
 $\mu$  165, 174, 175  
 $\mu$  ( ) , 22  
 $\mu$  g 270  
 $\mu$  236  
 R 263  
 $\mu$  , 22, 19  
 $\mu$  204, 205, 99, 219, 263, 277,  
 285, 299  
 $\mu$  270  
 $\mu$  - 266  
 $\mu$  264  
 $\mu$  , 63, 55  
 $\mu$  38  
 $\mu$  GE 57  
 $\mu$  SE 49  
 $\mu$  67  
 $\mu$  73  
 $\mu$  264  
 $\mu$  86  
 $\mu$  86  
 $\mu$  , 8  
 o 292  
 o 321  
 $\mu$  , 10, 4, 33, 322  
 $\mu$  324  
 $\mu$  279  
 $\mu$  GE 53  
 $\mu$  279  
 $\mu$  317  
 $\mu$  224, 245, 319  
 $\mu$  245, 321  
 $\mu$  320  
 $\mu$  ( ) 3  
 SNR 244  
 $\mu$  B1 285  
 $\mu$  327  
 $\mu$  318  
 $\mu$  74  
 $\mu$  318  
 $\mu$  148, 150  
 $\mu$  68  
 $\mu$  69  
 $\mu$  73  
 $\mu$  72  
 $\mu$  71  
 $\mu$  318  
 $\mu$  3, 320  
 $\mu$  10  
 $\mu$  10  
 $\mu$  256  
 $\mu$  260  
 $\mu$  270  
 $\mu$  , 3, 245, 321  
 $\mu$  13  
 $\mu$  352  
 $\mu$  64  
 $\mu$  10  
 $\mu$  126, 156  
 $\mu$  12  
 $\mu$  12  
 $\mu$  12  
 $\mu$  84  
 $\mu$  16  
 $\mu$  18  
 $\mu$  , 14, 38  
 $\mu$  180  
 $\mu$  184, 185  
 $\mu$  181  
 $\mu$  181  
 $\mu$  189, 190  
 $\mu$  181, 184  
 $\mu$  182  
 $\mu$  ( )  
 $\mu$  , 77  
 $\mu$  . SAR  
 $\mu$  266  
 $\mu$  26, 29, 74, 92, 236  
 $\mu$  142  
 $\mu$  139  
 $\mu$  180  
 $\mu$  spin-echo (SE) 32, 139, 140  
 $\mu$  GE 33  
 $\mu$  29  
 $\mu$  257  
 $\mu$  127  
 $\mu$  , 55  
 $\mu$  167  
 $\mu$  120, 131  
 $\mu$  12  
 $\mu$  (steady state) , 57, 138  
 $\mu$  FSE 115  
 $\mu$  285, 286  
 $\mu$  7, 18  
 $\mu$  314  
 $\mu$  195, 5, 209, 218  
 $\mu$  218  
 $\mu$  218

218  
 J , 119  
 μ μ 91, 104  
 μ 23, 70  
 Carr - Purcell - Meiboom - Gill (CPMG) 114  
 μ μ 22  
 μ μ 113  
 μ 12  
 μ 12  
 μ 24  
 μ μ 24  
 μ 318  
 μ μ 21  
 29, 70  
 70  
 215, 221  
 Larmor 20, 22, 24, 26  
 μ μ 277  
 μ μ 76  
 12  
 μ μ μ Fourier (FFT) , 86  
 2D FFT 89  
 μ 1D FFT 86  
 163  
 291  
 μ 94  
 Echo Planar Imaging (EPI) . EPI (Echo Planar Imaging)  
 μ GMN 189, 191, 350  
 μ 220  
 215  
 μ 47  
 μ 147  
 μ μ 174, 312, 310  
 224  
 μ 219  
 μ 187, 219  
 μ μ 174  
 μ μ 175  
 μ μ 175  
 μ μ 213  
 moire zebra 221  
 μ μ 79, 220, 263  
 142, 147, 156  
 214  
 213  
 μ μ 108  
 μ μ 178, 234  
 μ μ 108, 120, 166, 230  
 μ μ 224, 242, 288  
 1 228, 288  
 2 μ μ 16  
 μ μ 13  
 99  
 109  
 18  
 μ 221  
 μ μ  
 μ 63  
 μ μ 55  
 μ μ 107  
 5  
 μ 182  
 μ μ (ADC) 293  
 μ entry slice 187  
 μ time of flight (TOF) 187  
 μ μ 248  
 μ μ μ 316  
 μ μ imaginary  
 29, 70  
 in phase 172  
 70  
 172  
 215, 221  
 μ μ μ  
 μ μ 352  
 μ μ (MRS)  
 274, 288, 309  
 μ (SVS) 311  
 μ μ  
 (MRSI) 288, 312  
 55  
 spin - spin 25  
 spin - μ 25  
 μ μ 25  
 μ 228  
 CBF 302  
 CBV 302  
 MTT 302  
 296  
 clip 12  
 μ μ μ μ 163.  
 μ μ 288  
 μ μ μ μ 130, 165, 248  
 μ μ 167  
 μ μ 168  
 μ μ 167  
 224  
 TE e active , 115, 120, 150, 115  
 TE reverse 150, 152  
 T e active 159  
 126, 130  
 323  
 μ 77  
 TR , 14, 35, 74, 111  
 TR SNR 237

TR	40	92	
	, 14, 32, 58, 74, 111, 235, 242, 310		248, 279
$\mu$	$\mu$ 108	3D	249
TE	SNR 237		FSE 250
T	43		258
	$\mu$ , 99, 252	-	92
	259		, 65
	T1 14, 25, 38	$\mu$	$\mu$ 6
	42	$\mu$	82
	T2 14, 26, 38		
	42		
	73, 87		89

**A**

ACQ.  $\mu$  NEX  
 acquisition time , 99  
 acquisition window 77  
 ADC (  $\mu$  ) 293  
 294  
 adiabatic pulse , 169  
 aliasing , 220  
 AINiCo 315  
 anisotropy map 296  
 antiparallel , 19  
 arterial spin labelling (ASL) , 286, 303  
 artifact 348.  $\mu$   
 averaging. . serial averaging

**B**

BO , 20  
 B1 , 22, 318  
 B1  $\mu$   $\mu$  B1  
 band artifact 142, 147, 156  
 bandwidth.  $\mu$  ;  $\mu$   
 rBW  
 b factor 293  
 binomial pulse.  $\mu$   $\mu$   
 bipolar 197, 198, 348  
 black blood imaging 348  
 black blood IR 135  
 $\mu$  137  
 $\mu$   $\mu$  137  
 black blood MR imaging 182, 209  
 BLADE 102  
 blip 102, 272  
 Bloch 26  
 blood-pool 209  
 body coil 3, 320  
 BOLD , 286, 306  
 bolus arrival time 201  
 bolus chasing 207  
 bolus tracking 201  
 BOPTA 63  
 boundary e ct 228  
 breath-hold 215  
 bright blood MRA 181, 182, 348  
 Brown 291

**C**

Carr - Purcell - Meiboom - Gill (CPMG) 114  
 CBF 302, 303  
 CBV 302  
 CE-MRA 201, 229  
 $\mu$  205  
 - 202  
 $\mu$   $\mu$   $\mu$  204  
 $\mu$   $\mu$  201  
 centrally ordered phase encoding 217  
 centric profile order 202, 101, 159  
 chemical pre-saturation.  $\mu$   $\mu$   
 chemical shift.  $\mu$   $\mu$   
 chemical shift imaging (CSI).  $\mu$   $\mu$  (MRSI)  
 $\mu$   $\mu$   
 CHEM SAT 170  
 cine 212  
 circularly polarized (CP) 321  
 CISS (constructive interference in steady state) 156  
 clip  $\mu$  12  
 CNR ( ) , 246  
 coherence 142, 144  
 coherent GE. . rewind GE  
 coil 12  
 color-coded orientation map 296  
 composite pulse.  $\mu$   $\mu$   
 concatenation 95, 255  
 concentration curve 302  
 conjugate symmetry 91  
 continuous ASL 304  
 contrast-detail curve 259  
 contusion 167  
 cross talk 187, 95, 175, 232  
 cryogen , 316  
 cryostat 316, 325  
 CSI.  $\mu$   $\mu$   $\mu$  (MRSI)  
 $\mu$   $\mu$

**D**

data points 77, 83  
 dB/dt 330  
 dead time 95  
 decay time. . T2 decay  
 deconvolution 302

decoupling 321  
 default gradient mode 324  
 DESS 153  
 dewar 316  
 diamagnetic , 55  
 DICOM 5  
 DIET 119  
 di use axonal injury 308  
 di usion 349  
 di usion tensor imaging (DTI) 295  
 Dixon 172, 228  
   three-point Dixon 172  
     μ 173  
     μ μ 173  
     μ 173  
 DOTA 62  
 double IR 209, 135  
 driven Equilibrium FSE 125  
 DTPA 62  
 DTPA-BMA 62  
 dual echo FSE 123  
 dual echo SE , 123, 113, 243  
   μ μ 113  
   μ 113  
 duty cycle 324  
 DWIBS 299  
 DWI ( μ ) 102, 274, 291  
   μ 297  
   DWI 295  
   μ (ADC) 293  
 DW MR neurography 299  
 dynamic contrast enhancement MRI (DCE-MRI) 303  
 dynamic susceptibility contrast MRI (DSC-MRI) 62, 301

**E**

ECG gating 218  
 echo-shifting 274  
 echo spacing ESP , 120, 277, 281, 118, 275  
 echo time. .  
 echo train , 114, 113  
 Eddy currents 325  
 e ective TE. . TE e ective  
 elliptical centric 202, 104, 312  
 emergency shutdown button 10  
 entry slice 186, 187  
 EOB-DTPA 63  
 EPI ( Echo Planar Imaging) , 102, 272  
   EPI factor 281  
   GE-EPI 275, 301, 307  
   IR-EPI 275  
   multishot EPI 102, 273  
   SE-EPI 275, 301, 307  
   single shot EPI 102, 273, 307  
     275  
     276  
   μ 274  
   μ μ 279  
   μ 278  
   - 272  
   μ μ 275

ETL (echo train length) , 115, 116, 114, 281  
 even echo rephasing 184  
 excitation 349  
 eye-liner 12

**F**

FAME 147  
 Faraday 4, 22  
 fast FLAIR 131  
 fast Fourier transform. . μ μ μ  
   Fourier (FFT)  
 fast GE 156  
   3D Fast GE 159  
     μ μ 159  
 fast spin echo (FSE) 114  
   magnetization transfer contrast (MTC) 119, 176  
     116, 120  
     μ SE 114, 115  
     μ 115  
     μ μ 119  
     μ 118  
     μ μ μ 115  
     μ μ μ 120  
     μ μ 115  
     250  
 FAT SAT 170  
 fat/water shift 82  
 ferromagnetic , 55  
 FFT. . μ μ μ Fourier (FFT)  
 FID , 26, 139, 321 μ FID 30  
 filling factor 244  
 first-level mode 326  
 first pass 302  
 FISP 150  
 flag 191  
 FLAIR , 131, 164  
   μ 131  
   μ μ 132  
   μ 132  
   μ μ 132  
 FLASH. . gradient echo (GE)  
 flip angle , 23  
 flow comp (FC) 191  
 flow encoding axis 200, 349  
 flow related enhancement (FRE). . μ  
 flow related signal loss. . μ  
 flow voids 182  
 fluoro triggering 202  
 fMRI ( μ ) , 102, 274,  
   287, 306, 291  
   μ 307  
 foldover suppression , 222  
 Fourier transform. . μ μ μ Fourier  
   (FFT)  
 FOV (field of view) , 73, 107, 166  
   μ 221  
 fractional RF 156



free induction decay. . FID  
 frequency domain 86  
 frequency encoding gradient , 74  
 frequency matrix 77  
 frequency oversampling 221  
 fresh blood imaging 196, 349  
 fringe field , 8  
 FSE. . fast spin echo (FSE)  
 FSE variable flip angle 210, 121  
 $\mu$   $\mu$  122  
 $\mu$  122  
 full echo train 123  
 fully rewound GE , 153  
 $\mu$  155  
 $\mu$   $\mu$  156  
 $\mu$  156  
 $\mu$   $\mu$  155

**G**

gantry 1  
 gating 5, 215, 218  
 Gfe 74  
 ghost artifacts , 214  
 Gibbs ringing 229  
 Gpe 74  
 gradient arrays 324  
 gradient coils , 4  
 gradient echo (GE) , 15, 35, 33, 137  
 52-64  
 52, 138  
 GE PDW 59  
 GE T1W 58  
 GE T2\*W 59  
 $\mu$  57 GE 156  
 $\mu$  53  
 gradient field 4  
 gradient moment nulling (GMN). .  
 $\mu$  GMN  
 gradient spoiling 144  
 GRAPPA 266  
 GRASE 281  
 Gss 74

**H**

Hahn echo 139, 141  
 half Fourier 202, 106, 125, 253  
 half scan 106  
 halo vest 12  
 HASTE 125  
 Herz 70  
 high-low profile order 101  
 high order shim (HOS) 166, 317  
 HP-DO3A 62  
 hyperecho 122

**I**

imaginary , 91  
 incoherent GE. . spoiled GE  
 India ink etching 228

in-phase , 172, 228  
 interleaved 95  
 interpolation 103  
 intra-voxel dephasing 185  
 inversion recovery (IR) , 126, 256  
 $\mu$  IR 164  
 isotropic image 295

**J**

J coupling , 119

**K**

keyhole filling , 104  
 k-space. . -  
 k-space shutter 107  
 k-t BLAST 269  
 k-t SENSE 269

**L**

laboratory reference frame 24  
 Larmor , 20  
 Lauterbur, Paul 88  
 LAVA 147  
 linearity 323  
 linear polarized (LP) 321  
 linear profile order 101  
 longitudinal magnetization 350  
 Lorentz 288, 323  
 low-high profile order 101  
 low-pass filter 81

**M**

MO , 20  
 magic angle 234  
 Magnetic Resonance Imaging (MRI) 350  
 magnetization preparation 126  
 magnetization prepared GE 156  
 magnetization transfer contrast (MTC) 195, 119, 118,  
 176, 248  
 FSE 176  
 $\mu$  177  
 $\mu$   $\mu$  178  
 $\mu$  178  
 magnetophosphenes 331  
 magnitude image , 91  
 main power switch 10  
 Maki artifact 203  
 Mansfield, Sir Peter 88  
 matrix. .  $\mu$   
 MEDIC 162  
 MERGE 162  
 mFFE 162  
 MIP 205, 212, 350  
 modulus. . magnitude image  
 moiré 221  
 MOTSA 195  
 MP-RAGE 159  
 MRA. .  $\mu$  (MRA)  
 MR conditional , 9  
 MRS. .  $\mu$   $\mu$   $\mu$

- (MRS)  
 MR safe , 8  
 MRSI. .  $\mu$   $\mu$  (MRSI)  
 MR unsafe , 9  
 mSENSE 266  
 MTT 302  
 multichannel excitation 286  
 multiecho FSE 123  
 multiecho GE 160  
 $\mu$  162  
 multiecho SE , 113  
 multiplanar reconstruction (MPR) 205  
 multishot EPI 273  
 multi-slab 97, 221, 246, 249  
 multislice , 95, 116, 219  
 A  $\mu$  255  
 multi-station peripheral MRA 206, 207  
 multivane 102
- N**  
 N/2 ghost artifact 280  
 navigator echo gating 218  
 NEX. .  $\mu$  NEX  
 Nobel 88  
 no phase wrap , 222  
 normal mode 326  
 NSA. .  $\mu$  NEX  
 null point 127  
 number of excitations. .  $\mu$  NEX  
 Nyquist  
 280  
 $\mu$  , 78
- O**  
 out-of-phase , 172, 228
- P**  
 PACS 5  
 parallel 351  
 parallel imaging 351. .  
 paramagnetic , 55  
 partial echo , 108, 108, 231  
 partial voluming 248  
 partition 160  
 pathology weighting 130, 135  
 PC-MRA 197, 198, 91  
 201  
 penumbra 305  
 perfusion 351  
 peripheral nerve stimulation. . PNS  
 phase contrast 197  
 phased array coil. .  
 phase encoding gradient , 74  
 phase image , 91  
 phase oversampling , 222  
 phase shift 184  
 pixel 46, 239  
 PNS , 10, 330, 324, 330  
 Poppen-Blaylock 12  
 ppm 163, 315  
 precession. .  $\mu$   
 pre-emphasis 325  
 prescan 318  
 PRESS 312  
 PRESTO 274, 301  
 profile order 101  
 projection reconstruction 102  
 PROPELLER 102  
 prospective triggering 218  
 proton density 352  
 pulse control unit 318  
 pulsed ASL 304  
 pulse sequence 352  
 PWI (  $\mu$  ) 102, 274,  
 287, 300  
 $\mu$  305
- Q**  
 quadrature 321  
 quench , 10, 316
- R**  
 radial blade 209, 102, 219, 299  
 radial 102, 231, 273  
 radiofrequency (RF) pulse 352  
 ramped RF pulses 194  
 ramp sampling 277  
 raw data 84  
 rBW. . rBW  
 readout gradient 74  
 real IR 133  
 $\mu$  134  
 $\mu$   $\mu$  135  
 $\mu$  135  
 $\mu$   $\mu$  135  
 real , 91  
 receiver bandwidth. . rBW  
 rectangular FOV 107, 221, 253, 263  
 rectilinear sequential 99  
 reduced matrix 106, 229, 253  
 reduction factor 263  
 relaxation , 25  
 repetition time. . TR  
 resonance 352  
 respiratory compensation 104, 217  
 respiratory triggering 215  
 retrospective gating 218  
 reverse-centric profile order 101  
 reverse-linear profile order 101  
 rewinder 148, 150  
 rewound GE 197, 148, 142  
 $\mu$  148  
 $\mu$   $\mu$  150  
 $\mu$  150  
 $\mu$   $\mu$  148  
 RF spoiling 144, 159  
 ringing artifact 203, 230, 281  
 ringing filter 230  
 rise time 323

ROI 202  
rotating reference frame 24

## S

sampling frequency , 77  
sampling rate 77  
sampling time 77  
SAR , 9, 122, 178, 175  
328  
328  
284  
 $\mu$  SAR 329  
327  
SAT 176  
moving SAT 174  
satpads 166  
saturation , 52  
scan percentage 106  
scan time , 99  
second-level mode 326  
selective excitation.  
SENSE 264  
mSENSE 266  
sequential-slice , 94, 219  
serial averaging , 104, 219, 241  
shared echo 124  
shielding 352  
active 317, 325  
passive 317  
shim coils 317  
shimming , 166  
active 317  
passive 317  
signal intensity curve 302  
sinc 329  
single shot EPI 273, 297  
single shot FSE 125  
single-slab 97, 221, 246, 249  
slice encoding 97  
slice gap 233.  $\mu$   $\mu$   
slice profile 232  
slice select gradient 74  
SMART 219  
SNR (  $\mu$  ) , 258, 237  
3D  $\mu$  246  
 $\mu$  NEX 241  
257  
238  
244  
 $\mu$  246, 283  
rBW 241  
 $\mu$  voxel 239  
258  
TR 237  
237  
SPACE 122  
SPAIR 169  
spatial encoding , 65  
spatial pre-saturation.  
 $\mu$

spatial resolution.  
SPECIAL 168  
spectral pre-saturation.  $\mu$   $\mu$   
spectroscopy 352  
spin echo (SE) , 15, 35, 32, 139, 111  
51  
 $\mu$  FSE 114, 115  
SE PDW 50  
SE T1W 49, 111  
SE T2W 50, 111  
 $\mu$  111  
 $\mu$   $\mu$  112  
 $\mu$  49  
 $\mu$  69  
 $\mu$  112  
 $\mu$   $\mu$  49, 112  
spin-lattice relaxation 25  
spin-spin relaxation 25  
SPIO (superparamagnetic iron oxides) 63  
SPIR 168  
 $\mu$  STIR 168  
spiral 103, 273  
split echo train 123  
spoiled GE 191, 144, 142  
 $\mu$  144  
 $\mu$   $\mu$  147  
 $\mu$  146  
 $\mu$   $\mu$  145  
spoiler gradient , 174, 165, 312  
steady state free precession (SSFP) GE 143, 150  
 $\mu$  150  
 $\mu$   $\mu$  152  
 $\mu$  152  
 $\mu$   $\mu$  152  
steady state free precession (SSFP) MRA 211  
STEAM 312  
stent 12  
stimulated echo (STE) , 121, 139, 141, 311  
STIR , 128, 164, 299  
 $\mu$  SPIR 168  
 $\mu$  128  
 $\mu$   $\mu$  130  
 $\mu$  130  
 $\mu$   $\mu$  130  
superparamagnetic , 55  
susceptibility.  $\mu$   
SVS.  $\mu$  (SVS)  
Swan-Ganz 11  
SWI (  $\mu$  ) 91,  
286, 308  
 $\mu$  308  
**T**  
T1 agents 60  
T1 recovery 25  
T1 relaxation time , 25  
T2 agents 60  
T2 blackout e ect 294  
T2 decay , 26  
T2\* decay 26, 27

- T2\* mapping 162  
 T2 relaxation time , 26  
 T2 shine through effect 294  
 TE effective. . TE effective  
 test bolus 201  
 THRIVE 147  
 time domain 86  
 time resolved MRA 205, 303  
 time-reversed GE. . steady state free precession  
 (SSFP) GE  
 time to echo 32  
 time of flight (TOF)  
 $\mu$  time of flight 187  
 TOF-MRA 191–212, 192–192, 286  
 193  
 194  
 trace image 295  
 tractography 296  
 transmit bandwidth. .  $\mu$   
 transverse magnetization 353  
 TRICKS 205  
 triggering 5, 218  
 triple IR 209, 135  
 truncation 229, 253
- turbo factor. . ETL (echo train length)  
 Turbo-FLASH 159  
 turbo-MRSI 312  
 turbo spin echo (TSE). . fast spin echo (FSE)
- V**
- velocity-selective ASL 304  
 VENC 198  
 VERSE 329  
 VIBE 147  
 VISTA 122  
 voxel 46, 239  
 VR 205, 212
- W**
- wrap-around , 220
- Z**
- zebra 221  
 zero filling , 253  
 zero interpolation 147  
 zipper 233  
 z 21
- $\mu$**
- 3D volume interpolated GE 147  
 4D-MRA 205, 303