

**Table S1.** Specifics of DCE-MRI Techniques Used

| MRI techniques      |   |  |  |  |   |
|---------------------|---|--|--|--|---|
|                     | 1.5 T Signa (GE Healthcare, Milwaukee, WI)  |  | 1.5 T Intera Achieva (Philips Healthcare, Cleveland, OH)                         |  | 3.0 T Intera Achieva (Philips Healthcare, Cleveland, OH)                          |
| year                | 2004-2005*  | 2005-2008  | 2005-2008  | 2008-  | 2010-   |
| T2 weighted imaging | Fast spin echo sequences (axial)  | Fast spin echo sequences (axial)   | Fast spin echo sequences (axial)   | Fast spin echo sequences (axial)   | Fast spin echo sequences (axial)  |
| TR/TE               | 8500/102  | 5000/106   | 15000/120  | 2000/326   | 2000/216  |
| Slice thickness     | 5 mm  | 2 mm   | 2 mm   | 2 mm   | 1.6 mm  |
| Matrix size         | 256x256 mm  | 256x256 mm   | 352x 258   | 480x480 mm   | 450x450 mm  |
| FOV                 | 340 mm  | 380 mm   | 380 mm   | 360 mm   | 330 mm  |
| Dynamic imaging     | 2D gradient echo sequences<br>One pre- and four post-contrast enhancement (coronal) | 3D gradient echo sequences<br>One pre- and six post-contrast enhancement (axial) | 3D gradient echo sequences<br>One pre- and six post-contrast enhancement (axial) | 3D gradient echo sequences<br>One pre- and six post-contrast enhancement (axial) | 3D gradient echo sequences<br>One pre- and five post-contrast enhancement (axial) |
| TR/TE               | 7.7/4.2   | 4.4/2.0  | 4.5/2.2  | 5.5/2.7  | 4.8/2.4   |
| Flip angle          | 30°   | 10°  | 10°  | 10°  | 10°   |
| Slice thickness     | 3mm   | 2mm  | 2 mm   | 2 mm   | 1.6 mm  |
| Matrix size         | 256x224 or 512x256 mm   | 320x320 mm   | 352 x 352  | 480x480 mm   | 450 x 450   |
| FOV                 | 340 mm  | 340 mm   | 360 mm   | 360 mm   | 350 mm  |
| Acquisition time    | 56/128 second   | 56 second  | 88 sec   | 75 second  | 75 second   |

\*In 2004 – 2005 with GE Signa scanner, unenhanced images were obtained using two matrix sizes (256 × 224 and 512 × 256), and after contrast injection, the first, second, and fourth series of images were obtained in the 256 × 224 matrix format and the third series of images were obtained in the 512 × 256 matrix format. The purpose of the larger matrix size used at the third series of images was to provide one higher-spatial-resolution sequence during the dynamic study. In addition, the sagittal T1 weighted images were performed after the dynamic study with the same parameter as the dynamic imaging in these studies (acquisition: 56 sec).

**Table S2. Pathogenic mutations identified in study participants\***

| Gene         | HGVS g. (GRCh37)                         | HGVS c.                         | HGVS p.                        | Mutation Type  | Count |
|--------------|--|---------------------------------|--------------------------------|----------------|-------|
| <i>ATM</i>   | NC_000011.9:g.108178661dupA              | NM_000051.3:c.5712dupA          | NP_000042.3:p.Ser1905Ilefs     | Frameshift     | 1     |
| <i>ATM</i>   | NC_000011.9:g.108214077delT              | NM_000051.3:c.8397delT          | NP_000042.3:p.Gln2800SerfsTer6 | Frameshift     | 1     |
| <i>BRCA1</i> | del exons 1-19                           |                                 |                                | Large_Deletion | 1     |
| <i>BRCA1</i> | del exons 5-14                           |                                 |                                | Large_Deletion | 1     |
| <i>BRCA1</i> | NC_000017.10:g.41199659C>T               | NM_007294.3:c.5467+1G>A         |                                | Splicing       | 1     |
| <i>BRCA1</i> | NC_000017.10:g.41200832_41211098del      |                                 |                                | Large_Deletion | 1     |
| <i>BRCA1</i> | NC_000017.10:g.41203935_41229354del      |                                 |                                | Large_Deletion | 1     |
| <i>BRCA1</i> | NC_000017.10:g.41205392_41209254del      |                                 |                                | Large_Deletion | 1     |
| <i>BRCA1</i> | NC_000017.10:g.41209082dupG              | NM_007294.3:c.5266dupC          | NP_009225.1:p.Gln1756Profs     | Frameshift     | 8     |
| <i>BRCA1</i> | NC_000017.10:g.41213921_41238950del      |                                 |                                | Large_Deletion | 1     |
| <i>BRCA1</i> | NC_000017.10:g.41213921_41278683del      |                                 |                                | Large_Deletion | 1     |
| <i>BRCA1</i> | NC_000017.10:g.41215920G>T               | NM_007294.3:c.5123C>A           | NP_009225.1:p.Ala1708Glu       | Missense       | 1     |
| <i>BRCA1</i> | NC_000017.10:g.41223121G>A               | NM_007294.3:c.4810C>T           | NP_009225.1:p.Gln1604Ter       | Nonsense       | 1     |
| <i>BRCA1</i> | NC_000017.10:g.41223242G>C               | NM_007294.3:c.4689C>G           | NP_009225.1:p.Tyr1563Ter       | Nonsense       | 1     |
| <i>BRCA1</i> | NC_000017.10:g.41226347C>T               | NM_007294.3:c.4675+1G>A         |                                | Splicing       | 1     |
| <i>BRCA1</i> | NC_000017.10:g.41234420C>T               | NM_007294.3:c.4357+1G>A         |                                | Splicing       | 1     |
| <i>BRCA1</i> | NC_000017.10:g.41234457dupC              | NM_007294.3:c.4321dupG          | NP_009225.1:p.Asp1441Glyfs     | Frameshift     | 1     |
| <i>BRCA1</i> | NC_000017.10:g.41243480_41243483delTTGA  | NM_007294.3:c.4065_4068delTCAA  | NP_009225.1:p.Asn1355Lysfs     | Frameshift     | 1     |
| <i>BRCA1</i> | NC_000017.10:g.41243513delT              | NM_007294.3:c.4035delA          | NP_009225.1:p.Glu1346Lysfs     | Frameshift     | 1     |
| <i>BRCA1</i> | NC_000017.10:g.41243844_41243848delTTTAC | NM_007294.3:c.3700_3704delGTAAA | NP_009225.1:p.Val1234Glnfs     | Frameshift     | 1     |
| <i>BRCA1</i> | NC_000017.10:g.41244148C>A               | NM_007294.3:c.3400G>T           | NP_009225.1:p.Glu1134Ter       | Nonsense       | 4     |
| <i>BRCA1</i> | NC_000017.10:g.41244319_41244320delCT    | NM_007294.3:c.3228_3229delAG    | NP_009225.1:p.Gly1077Alafs     | Frameshift     | 1     |

|       |  |   |                            |            |    |
|-------|--|---|----------------------------|------------|----|
| BRCA1 | NC_000017.10:g.41244496_41244500dupTCTCA                   | NM_007294.3:c.3048_3052dupTGAGA                 | NP_009225.1:p.Asn1018Metfs | Frameshift | 1  |
| BRCA1 | NC_000017.10:g.41244679G>A                                 | NM_007294.3:c.2869C>T                           | NP_009225.1:p.Gln957Ter    | Nonsense   | 1  |
| BRCA1 | NC_000017.10:g.41244866_41244867delTT                      | NM_007294.3:c.2681_2682delAA                    | NP_009225.1:p.Lys894Thrfs  | Frameshift | 3  |
| BRCA1 | NC_000017.10:g.41245073delG                                | NM_007294.3:c.2475delC                          | NP_009225.1:p.Asp825Glufs  | Frameshift | 1  |
| BRCA1 | NC_000017.10:g.41245091delG                                | NM_007294.3:c.2457delC                          | NP_009225.1:p.Asp821Ilefs  | Frameshift | 2  |
| BRCA1 | NC_000017.10:g.41245285C>A                                 | NM_007294.3:c.2263G>T                           | NP_009225.1:p.Glu755Ter    | Nonsense   | 1  |
| BRCA1 | NC_000017.10:g.41245603C>A                                 | NM_007294.3:c.1945G>T                           | NP_009225.1:p.Glu649Ter    | Nonsense   | 1  |
| BRCA1 | NC_000017.10:g.41245632A>T                                 | NM_007294.3:c.1916T>A                           | NP_009225.1:p.Leu639Ter    | Nonsense   | 1  |
| BRCA1 | NC_000017.10:g.41245992delT                                | NM_007294.3:c.1556delA                          | NP_009225.1:p.Lys519Argfs  | Frameshift | 2  |
| BRCA1 | NC_000017.10:g.41246532dupT                                | NM_007294.3:c.1016dupA                          | NP_009225.1:p.Val340Glyfs  | Frameshift | 1  |
| BRCA1 | NC_000017.10:g.41246586C>T                                 | NM_007294.3:c.962G>A                            | NP_009225.1:p.Trp321Ter    | Nonsense   | 1  |
| BRCA1 | NC_000017.10:g.41246765A>C                                 | NM_007294.3:c.783T>G                            | NP_009225.1:p.Tyr261Ter    | Nonsense   | 1  |
| BRCA1 | NC_000017.10:g.41258494C>T                                 | NM_007294.3:c.191G>A                            | NP_009225.1:p.Cys64Tyr     | Missense   | 1  |
| BRCA1 | NC_000017.10:g.41258504A>C                                 | NM_007294.3:c.181T>G                            | NP_009225.1:p.Cys61Gly     | Missense   | 3  |
| BRCA1 | NC_000017.10:g.41276047_41276048delCT                      | NM_007294.3:c.68_69delAG                        | NP_009225.1:p.Glu23Valfs   | Frameshift | 24 |
| BRCA1 | NC_000017.10:g.41276113T>C                                 | NM_007294.3:c.1A>G                              | NP_009225.1:p.Met1Val      | Missense   | 1  |
| BRCA2 | NC_000013.10:g.32893463G>C                                 | NM_000059.3:c.316+1G>C                          |                            | Splicing   | 1  |
| BRCA2 | NC_000013.10:g.32900750G>A                                 | NM_000059.3:c.631G>A                            | NP_000050.2:p.Val211Ile    | Missense   | 1  |
| BRCA2 | NC_000013.10:g.32906506_32906514delAACAGTTGTinsGATACCTTCAG | NM_000059.3:c.891_899delAACAGTTGTinsGATACCTTCAG | NP_000050.2:p.Thr298Ilefs  | Frameshift | 1  |
| BRCA2 | NC_000013.10:g.32906911_32906912delGA                      | NM_000059.3:c.1296_1297delGA                    | NP_000050.2:p.Asn433Glnfs  | Frameshift | 3  |
| BRCA2 | NC_000013.10:g.32907411_32907415delCTTAT                   | NM_000059.3:c.1796_1800delCTTAT                 | NP_000050.2:p.Ser599Terfs  | Frameshift | 1  |
| BRCA2 | NC_000013.10:g.32907428delA                                | NM_000059.3:c.1813delA                          | NP_000050.2:p.Ile605Tyrfs  | Frameshift | 1  |
| BRCA2 | NC_000013.10:g.32910872dupA                                | NM_000059.3:c.2380dupA                          | NP_000050.2:p.Met794Asnfs  | Frameshift | 1  |
| BRCA2 | NC_000013.10:g.32911300_32911303delACAA                    | NM_000059.3:c.2808_2811delACAA                  | NP_000050.2:p.Ala938Profs  | Frameshift | 3  |
| BRCA2 | NC_000013.10:g.32912431C>A                                 | NM_000059.3:c.3939C>A                           | NP_000050.2:p.Tyr1313Ter   | Nonsense   | 1  |

|       |   |                                  |                                 |            |    |
|-------|---|----------------------------------|---------------------------------|------------|----|
| BRCA2 | NC_000013.10:g.32912619_32912622delGAAA   | NM_000059.3:c.4127_4130delGAAA   | NP_000050.2:p.Gly1376Alafs      | Frameshift | 1  |
| BRCA2 | NC_000013.10:g.32912655_32912656delCTinsA | NM_000059.3:c.4163_4164delCTinsA | NP_000050.2:p.Thr1388Asnfs      | Frameshift | 1  |
| BRCA2 | NC_000013.10:g.32912817C>A                | NM_000059.3:c.4325C>A            | NP_000050.2:p.Ser1442Ter        | Nonsense   | 1  |
| BRCA2 | NC_000013.10:g.32913368_32913369delAA     | NM_000059.3:c.4876_4877delAA     | NP_000050.2:p.Asn1626Serfs      | Frameshift | 1  |
| BRCA2 | NC_000013.10:g.32913428_32913431delGAAA   | NM_000059.3:c.4936_4939delGAAA   | NP_000050.2:p.Glu1646Glnfs      | Frameshift | 1  |
| BRCA2 | NC_000013.10:g.32913439_32913440delAA     | NM_000059.3:c.4947_4948delAA     | NP_000050.2:p.Pro1651Cysfs      | Frameshift | 1  |
| BRCA2 | NC_000013.10:g.32913565dupA               | NM_000059.3:c.5073dupA           | NP_000050.2:p.Trp1692Metfs      | Frameshift | 1  |
| BRCA2 | NC_000013.10:g.32913730dupT               | NM_000059.3:c.5238dupT           | NP_000050.2:p.Asn1747Terfs      | Frameshift | 2  |
| BRCA2 | NC_000013.10:g.32913842_32913843delAA     | NM_000059.3:c.5350_5351delAA     | NP_000050.2:p.Asn1784Hisfs      | Frameshift | 1  |
| BRCA2 | NC_000013.10:g.32913854dupT               | NM_000059.3:c.5362dupT           | NP_000050.2:p.Ser1788PhefsTer19 | Frameshift | 1  |
| BRCA2 | NC_000013.10:g.32914214_32914215delCT     | NM_000059.3:c.5722_5723delCT     | NP_000050.2:p.Leu1908Argfs      | Frameshift | 2  |
| BRCA2 | NC_000013.10:g.32914349G>T                | NM_000059.3:c.5857G>T            | NP_000050.2:p.Glu1953Ter        | Nonsense   | 1  |
| BRCA2 | NC_000013.10:g.32914356C>A                | NM_000059.3:c.5864C>A            | NP_000050.2:p.Ser1955Ter        | Nonsense   | 1  |
| BRCA2 | NC_000013.10:g.32914401C>A                | NM_000059.3:c.5909C>A            | NP_000050.2:p.Ser1970Ter        | Nonsense   | 1  |
| BRCA2 | NC_000013.10:g.32914417T>A                | NM_000059.3:c.5925T>A            | NP_000050.2:p.Cys1975Ter        | Nonsense   | 1  |
| BRCA2 | NC_000013.10:g.32914438delT               | NM_000059.3:c.5946delT           | NP_000050.2:p.Ser1982Argfs      | Frameshift | 15 |
| BRCA2 | NC_000013.10:g.32914616C>T                | NM_000059.3:c.6124C>T            | NP_000050.2:p.Gln2042Ter        | Nonsense   | 1  |
| BRCA2 | NC_000013.10:g.32914767_32914768delTT     | NM_000059.3:c.6275_6276delTT     | NP_000050.2:p.Leu2092Profs      | Frameshift | 1  |
| BRCA2 | NC_000013.10:g.32929059_32929060delCT     | NM_000059.3:c.7069_7070delCT     | NP_000050.2:p.Leu2357Valfs      | Frameshift | 1  |
| BRCA2 | NC_000013.10:g.32930687C>T                | NM_000059.3:c.7558C>T            | NP_000050.2:p.Arg2520Ter        | Nonsense   | 2  |
| BRCA2 | NC_000013.10:g.32936732G>C                | NM_000059.3:c.7878G>C            | NP_000050.2:p.Trp2626Cys        | Missense   | 1  |
| BRCA2 | NC_000013.10:g.32937348C>T                | NM_000059.3:c.8009C>T            | NP_000050.2:p.Ser2670Leu        | Missense   | 1  |
| BRCA2 | NC_000013.10:g.32937636delC               | NM_000059.3:c.8297delC           | NP_000050.2:p.Thr2766Asnfs      | Frameshift | 2  |
| BRCA2 | NC_000013.10:g.32937640del                | NM_000059.3:c.8301del            | NP_000050.2:p.Glu2769Lysfs      | Frameshift | 1  |
| BRCA2 | NC_000013.10:g.32954279dupA               | NM_000059.3:c.9253dupA           | NP_000050.2:p.Thr3085Asnfs      | Frameshift | 1  |

|       |                                       |                              |                               |            |     |
|-------|---------------------------------------|------------------------------|-------------------------------|------------|-----|
| BRCA2 | NC_000013.10:g.32968982dupT           | NM_000059.3:c.9413dupT       | NP_000050.2:p.Leu3138Phefs    | Frameshift | 1   |
| BRCA2 | NC_000013.10:g.32969004_32969005delGT | NM_000059.3:c.9434_9435delTG | NP_000050.2:p.Ser3147Cysfs    | Frameshift | 2   |
| BRCA2 | NC_000013.10:g.32969024_32969025delAG | NM_000059.3:c.9455_9456delAG | NP_000050.2:p.Glu3152Glyfs    | Frameshift | 1   |
| BRIP1 | NC_000017.10:g.59871059C>A            | NM_032043.2:c.1372G>T        | NP_114432.2:p.Glu458Ter       | Nonsense   | 1   |
| CDH1  | NC_000016.9:g.68846147C>T             | NM_004360.3:c.1118C>T        | NP_004351.1:p.Pro373Leu       | Missense   | 1   |
| CDH1  | NC_000016.9:g.68862107G>A             | NM_004360.3:c.2195G>A        | NP_004351.1:p.Arg732Gln       | Missense   | 3   |
| CHEK2 | NC_000022.10:g.29091178C>A            | NM_007194.3:c.1312G>T        | NP_009125.1:p.Asp438Tyr       | Missense   | 1   |
| CHEK2 | NC_000022.10:g.29091207G>A            | NM_007194.3:c.1283C>T        | NP_009125.1:p.Ser428Phe       | Missense   | 1   |
| CHEK2 | NC_000022.10:g.29091220A>G            | NM_007194.3:c.1270T>C        | NP_009125.1:p.Tyr424His       | Missense   | 2   |
| CHEK2 | NC_000022.10:g.29091857delG           | NM_007194.3:c.1100delC       | NP_009125.1:p.Thr367Metfs     | Frameshift | 1   |
| CHEK2 | NC_000022.10:g.29121087A>G            | NM_007194.3:c.470T>C         | NP_009125.1:p.Ile157Thr       | Missense   | 4   |
| CHEK2 | NC_000022.10:g.29121230C>T            | NM_007194.3:c.444+1G>A       |                               | Splicing   | 1   |
| NBN   | NC_000008.10:g.90994964_90994965delAA | NM_002485.4:c.156_157delTT   | NP_002476.2:p.Ser53Cysfs      | Frameshift | 1   |
| PALB2 | NC_000016.9:g.23632683C>T             | NM_024675.3:c.3113G>A        | NP_078951.2:p.Trp1038Ter      | Nonsense   | 1   |
| PALB2 | NC_000016.9:g.23646388delG            | NM_024675.3:c.1479delC       | NP_078951.2:p.Thr494Leufs     | Frameshift | 1   |
| PALB2 | NC_000016.9:g.23647109_23647110delAG  | NM_024675.3:c.757_758delCT   | NP_078951.2:p.Leu253IlefsTer3 | Frameshift | 1   |
| PTEN  | NC_000010.10:g.89692800C>T            | NM_000314.6:c.284C>T         | NP_000305.3:p.Pro95Leu        | Missense   | 1   |
| TP53  | NC_000017.10:g.7578550G>A             | NM_000546.5:c.380C>T         | NP_001119586.1:p.Ser127Phe    | Missense   | 1   |
| Total |                                       |                              |                               |            | 158 |

\*Most participants had clinical testing in CLIA approved laboratories. In addition, all participants who provided a DNA samples were tested using BROCA panel. The HGVS nomenclature for one BRCA2 mutation was not found.

#There are 157 individual mutation carriers, one participant had a BRCA1 and an ATM mutation and another participant had a BRCA2 and a BRIP1 mutation.

**Table S3.** Patients' reasons of withdrawals from the study within 5 years (N=125)\*

| <b>Reasons</b>   | <b>n</b> | <b>%</b> |
|--|----------|----------|
| Health insurance or other payment issues                 | 34       | 27.2     |
| Prophylactic mastectomy                                  | 20       | 16.0     |
| Moved away/changed care provider                         | 14       | 11.2     |
| Time requirements/scheduling conflict                    | 4        | 3.2      |
| Concerned about MRI risk/rephrotoxicity concerns         | 5        | 4.0      |
| Medical complications/side effects                       | 5        | 4.0      |
| No longer met criteria                                   | 5        | 4.0      |
| Dissatisfaction with services                            | 6        | 4.8      |
| Pregnancy  | 11       | 8.8      |
| Death  | 3        | 2.4      |
| Life circumstances                                       | 2        | 1.6      |
| Other reasons (mentally distress or MRI machine not fit) | 2        | 1.6      |
| Withdrawal or lost to follow up, reasons unknown         | 26       | 20.8     |

\* Some patients indicated multiple reasons so the numbers do not add up.