Supplemental Digital Content 1: Description of image features

Table 1. Overview of imaging features with a short description for each feature. Features are grouped by MRI sequence.

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|  | DCE (12, 23) |  |  | DCE (continued) |  |
| 1 | Circularity | Measure for how similar the tumor shape is to a sphere | 20 | Mean smoothness | Maximum mean radial gradient intensity |
| 2 | Irregularity | Measure for the roughness of the tumor surface | 21 | Standard deviation Radial gradient histogram analysis frame 2\* | Standard deviation radial gradient histogram analysis at time point with maximum value |
| 3 | Volume | Volume of the tumor | 22 | Radial gradient histogram analysis frame 2\* | Radial gradient histogram analysis at time point with maximum value |
| 4 | Largest diameter | Largest distance between voxels pairs in the tumor segmentation |  | Fast-DCE (13) |  |
| 5 | Uptake | Average of (I1-I0)/I0 over the tumor voxels; I0 and I1 are the precontrast and the first postcontrast signal intensities | 1 | Maximum slope | Maximum slope of uptake contrast agent in lesion volume |
| 6 | Washout\* | Average of (I4-I1)/I1 over the tumor voxels; I1 and I4 are the first and last postcontrast signal intensities | 2 | Time of maximum slope | Time between maximum slope of contrast uptake in descending aorta and lesion volume |
| 7 | Signal enhancing ratio (SER)\* | Average of (I1-I0)/(I4-I0) over the tumor voxels; I0, I1 and I4 are the, precontrast and first and last postcontrast signal intensities | 3 | Time to enhancement | Time between maximum contrast uptake in descending aorta and start contrast uptake in lesion volume |
| 8 | Top uptake | Average uptake of the top 10 percent enhancing tumor voxels | 4 | Washout | Intensity gradient at last time point of Fast-DCE |
| 9 | Top washout\* | Average washout of the top 10 percent enhancing tumor voxels | 5 | General slope | Maximal slope of contrast uptake in lesion between time point aorta and any other time point during contrast uptake. |
| 10 | Volume uptake | Volume of tumor in washin image | 6 | Maximum enhancement | Maximal normalized intensity in lesion volume |
| 11 | Largest diameter uptake | Largest diameter of tumor in washin image |  |  |  |
|  |  | DCE (continued) |  | T2 | All T2 intensities are normalized to the intensity of the pectoral muscle(15) |
| 12 | Volume washout\* | Volume of tumor in washout image | 1 | Minimum intensity | Minimum intensity in lesion volume |
| 13 | Largest diameter washout\* | Largest diameter of tumor in washout image | 2-8 | 5th, 10th, 25th, 50th, 75th,90th and 95th percentile | Percentile of the intensities present in the lesion volume |
| 14 | Mean sharpness / margin gradient | The sharpness of the uptake of contrast at the tumor margin | 9 | Maximum intensity | Maximal intensity in lesion volume |
| 15 | Variance of sharpness / variance of margin gradient | The variance in sharpness of uptake of contrast at the tumor margin |  | ADC |  |
| 16 | Variation sharpness | Variance of sharpness at time point with maximum mean sharpness | 1 | Minimum intensity | Minimum intensity in lesion volume |
| 17 | Mean sharpness frame 2\* | Mean sharpness at first post-contrast | 2-8 | 5th, 10th, 25th, 50th, 75th,90th and 95th percentile | Percentile of the intensities present in the lesion volume |
| 18 | Variance sharpness frame 2\* | Variation sharpness at first post-contrast | 9 | Maximum intensity | Maximal intensity in lesion volume |
| 19 | Variation smoothness | Maximum standard deviation radial gradient histogram (RGH) values, see |

\* Feature not available in abbreviated breast MRI protocols