**Supplemental data**

**Tables:**

**Supplemental table 1**: **Comparison of clinicopathologic characteristics between successful tests and not successful tests.**

**Supplemental table 2**: **Comparison of clinicopathologic characteristics RECAP positive/negative/intermediate tumors.**

**Supplemental table 3:** **All characteristics and RECAP test outcomes per tumor.**

**Figures:**

**Supplemental Figure 1: Workflow of functional RECAP test and molecular analyses.** Fresh primary breast tumor specimens werecollected and irradiated with 5 Gy, incubated for 2 hours before formalin fixation and paraffin embedding. Immunofluorescence with RAD51 and Geminin antibodies was carried out on paraffin sections. Molecular analyses were all performed on an unirradiated sample from the same tumor.

**Supplemental figure 2**: ***BRCA1* promoter hypermethylation and RNA in situ hybridization by RNAscope.** M248, M253, M112 and M232 clearly showed presence of BRCA1 RNA, whereas in M94 (*BRCA1* deletion) no BRCA1 RNA was present. M131 and M277 showed heterogeneous presence of BRCA1 RNA. PPIB probe = positive control.

**Supplemental figure 3: Comparison of mutational signature analysis using all WGS-derived somatic mutations versus using somatic mutations present on SureSelect v5 target regions only.**

**Supplemental figure 4: Microsatellite instability.** Pentaplex PCRshowed presence of MSI in M77 and M188.