Supplemental Material

Supplemental Table S1: Pathology Reports for 17 patients

Patient	Diagnosis	Pattern Grade	Nuclear Grade	Mitotic Index	Nottingham Grade	Lympho-vascular Invasion	Tumor Size
#001	Invasive intraductal carcinoma	III	III	III	III	No	1.3 cm
#002	Invasive ductal carcinoma	III	II	I	II	No	8.0 mm
#003	Invasive ductal carcinoma with malignant heterologous chondroid/matrix and osteoclastic component Comedo carcinoma in situ Retrograde ductal and lobular involvement away from visible tumor	III	III III	III	III	No	2.5 cm
#004	Invasive ductal carcinoma Ductal carcinoma in situ within invasive component	II II	II	I	I	No	1.3 cm
#005	Invasive ductal carcinoma Intraductal carcinoma with lobular extension	II	II	III	II	No	2.5 cm
#006	Invasive ductal carcinoma Ductal carcinoma in situ	I	II II	I	I	No	6.0 mm (Invasive) 3.0 cm (In situ)
#007	Invasive and multiple foci of micro-invasive ductal carcinoma	III	III	II	III	Yes	0.5 cm (Invasive) 3.0 cm (Intraductal carcinoma)
#008	Invasive ductal carcinoma	III	III	III	III	Yes	1.4 cm

#009	Invasive ductal carcinoma	III	III	II	III	Yes	2.2 cm
#010	Residual invasive ductal carcinoma at periphery of previous site of tumor excision	III	III	II	III	No	1.3 cm
#011	Invasive ductal carcinoma Ductal carcinoma in situ	III II	III	III	III	Possible	0.9 cm
#012	Invasive ductal carcinoma with mucinous differentiation Ductal carcinoma in situ (minor)	III	II II	I	II	Yes	3.0 cm
#013	Invasive ductal carcinoma	III	II	I	II	No	7.0 mm
#014	Invasive lobular carcinoma	III	II	II	II	Yes	2.8 x 6.1 cm
#015	Invasive ductal carcinoma Ductal carcinoma in situ Intraductal carcinoma	I-II	III III	I	I-II	Yes	1.8 cm
#016	Invasive ductal carcinoma	III	III	III	III	Possible	2.3 cm
#017	Ductal hyperplasia - benign	N/A	N/A	N/A	N/A	N/A	N/A

Additional details:

#001: Focal chronic inflammation and fibrosis; ER (Estrogen Receptor; weakly positive); PR (Progesterone Receptor; negative); HER2 (Human EGF Receptor 2; negative).

#002: Although the invasive carcinoma is only 8 mm, there is extensive in situ carcinoma (nuclear grade II) with some necrosis; ER (positive); PR (positive); HER2 (negative).

#003: Fibrocystic changes with adenosis; mild intraductal hyperplasia; focal micro-calcifications; extensive necrosis; unequivocal lymphovascular invasion is not noted; ER (negative); PR (negative); HER2 (negative).

#004: Dense lymphocyte infiltration (invasive ductal carcinoma); solid tumor with central necrosis (ductal carcinoma in situ within invasive component); ER (positive); PR (positive); HER2 (positive).

#005: Solid and cribriform type with necrosis; mild peri-tumoral host lympho-plasmacytic response; microcysts; adenosis; ER (positive); PR (positive); HER2 (positive).

#006: Solid and cribriform with central necrosis and lobular extension; micro-calcifications associated with ductal carcinoma in situ; fibrocystic changes; fibrous stroma and microcysts; multiple microscopic foci of ductal carcinoma in situ; foci of intraductal carcinoma; intraductal papillomatosis; metaplasia adenosis; apocrine; atypical ductal hyperplasia; non-atypical ductal hyperplasia; ER (positive); PR (positive); HER2 (negative).

#007: Extensive intraductal carcinoma, comedo, cribriform and micropapillary types; focal necrosis; lobular extension; micro-calcifications associated with benign ducts and intraductal carcinoma; atypical lobular hyperplasia focally involving sclerosing adenosis; ER (weakly positive); PR (negative); HER2 (positive).

#008: Coagulative necrosis; focal lymphovascular invasion is noted; ER (positive); PR (positive); HER2 (positive).

#009: Moderate desmoplasia associated with tumor, but no inflammatory response; focal intraductal carcinoma; capsular and extra-capsular extension of cancer into surrounding adipose; benign fibrocystic changes; adenosis; ER (positive); PR (weakly negative); HER2 (negative). Unequivocal lymphovascular invasion is not noted; ER (positive); PR (positive); HER2 (negative).

#010: Unequivocal lymphovascular invasion is not noted; ER (positive); PR (positive); HER2 (negative).

#011: Focal peri-neural invasion (invasive ductal carcinoma); necrosis, cribriform (ductal carcinoma in situ); adenosis; benign intraductal papillary hyperplasia; ER (positive); PR (positive); HER2 (positive).

#012: Tubule formation grade III (invasive ductal carcinoma); cribriform without necrosis (ductal carcinoma in situ); micro-calcifications associated with benign ducts; fibrocystic changes; ER (positive); PR (negative); HER2 (negative).

#013: Tubule formation grade III; brisk peri- and intra-tumoral host lymphocytic response; micro-calcifications associated with benign lobules and fibrocystic changes; stromal fibrosis; microcysts; apocrine metaplasia; focal non-atypical ductal hyperplasia; ER (positive); PR (weakly positive); HER2 (negative).

#014: No microcalcification; ER (positive); PR (weakly positive); HER2 (negative).

#015: Cribriform with focal necrosis; fibrocystic changes; benign focal intraductal hyperplasia; ER (positive); PR (positive); HER2 (positive).

#016: Foci of in situ comedo carcinoma; foci of intraductal carcinoma; considerable desmoplasia; minimal inflammatory response; fibrocystic changes; focal intraductal hyperplasia; ER (positive); PR (positive); HER2 (negative).

#017: Fibrocystic changes; moderate intraductal hyperplasia; micro-calcifications.

Supplemental Material

Supplemental Table S2: Effect of methyl sulfone on cellular organization in cultured normal and cancerous human breast tissue

Sample	Tissue	Medium	Total time in culture (days)	Time in culture before adding MS (days)	Time in culture after adding MS (days)	Cellular organization one day after plating (no MS)	Cellular organization cultured with no MS (days)	Cellular organization cultured with MS (days)
#001	N, C	DMEM	33	1	32	N-chaotic C-chaotic	N-chaotic (33) C-chaotic (33)	N-structured (32) C-structured (32)
#002	N	DMEM	33	1	32	N-structured	N-chaotic (33)	N-structured (32)
#003	N, C	DMEM	33	1	32	N-chaotic C-chaotic	N-chaotic (33) C-chaotic (33)	N-structured (32) C-structured (32)
#004	C	DMEM	20	13	7	C-chaotic	C-chaotic (20)	C-structured (7)
#005	N, C	DMEM	11	8	3	N-chaotic C-chaotic	N-chaotic (11) C-chaotic (11)	N-structured (3) C-structured (3)
#006	N	DMEM	10	7	3	N-structured	N-chaotic (10)	N-structured (3)
#007	N, C	DMEM	12	7	5	N-chaotic C-chaotic	N-chaotic (12) C-chaotic (12)	N-structured (5) C-structured (5)
#008	N, C	WIT-P	25	22	3	N-chaotic C-chaotic	N-chaotic (25) C-chaotic (25)	N-structured (3) C-structured (3)
#009	N, C	WIT-P	29	26	3	N-structured C-chaotic	N-chaotic (29) C-chaotic (29)	N-structured (3) C-structured (3)
#010	N, C	WIT-P	45	38	7	N-structured C-chaotic	N-chaotic (45) C-chaotic (45)	N-structured (7) C-structured (7)
#011	N	WIT-P	90	30	60	N-chaotic	N-chaotic (90)	N-structured (60)
#012	N, C	WIT-P	35	13	22	N-structured C-chaotic	N-chaotic (35) C-chaotic (35)	N-structured (22) C-structured (22)
#013	N, C	WIT-P	57	1	56	N-chaotic C-chaotic	N-chaotic (57) C-chaotic (57)	N-structured (56) C-structured (56)
#014	N, C	WIT-P	44	8	36	N-chaotic C-chaotic	N-chaotic (44) C-chaotic (44)	N-structured (36) C-structured (36)
#015	N, C	WIT-P	50	19	31	N-chaotic C-chaotic	N-chaotic (50) C-chaotic (50)	N-structured (31) C-structured (31)
#016	N	WIT-P	49	19	30	N-structured	N-chaotic (49)	N-structured (30)
#017	N	WIT-P	90	45	45	N-chaotic	N-chaotic (90)	N-structured (45)

Definitions:

- **N:** normal tissue;
- **C:** cancerous tissue;
- **Cellular Organization-chaotic:** cultured tissue had little or no definition between cells; nuclei were found at multiple levels; cell boundaries were not well defined; overlapping cellular extensions existed between cells; where visible, nuclei were often pleomorphic; cells never appeared contact inhibited
- **Cellular organization-structured:** good definition between cells; nuclei were found in one plane of the microscope field; shape of nuclei was not pleomorphic; cell boundaries were well defined; cells often appeared to be contact inhibited.