- Metastatic breast carcinoma

Antibody	Reference	Breast carcinomas	Positive in other neoplasia
GATA3 (L50-823)	MAD-000632QD	96% but less sensitive for TNC	Urothelial and squamous carcinomas among others
GCDFP-15/BRST-2 (EP95)	MAD-000742QD	- 80% of tumors - Higher sensitivity for lobular carcinomas	Normal and neoplastic tissues with apocrine differentiation
Mammaglobin (304-1A5 Y 31A5)	MAD-000340QD	- More than 70% of tumors - Higher sensitivity for lobular carcinomas	Endocervical and endometrial normal and neoplastic tissue
Estrogen Receptor (SP1)	MAD-000306QD	Higher positive rate in well differentiated carcinomas	Frequently positive in gynecologic neoplasms among others
PAX8 (PAX8/1492)	MAD-000753QD	Negative	Ovarian, renal, thyroid and parathyroid
TTF1 (SPT24)	MAD-000486QD	2,5% of the cases	Lung and thyroid (papillary) carcinomas
WT1 (6F-H2)	MAD-005671QD	Negative	Nefroblastoma, Wilm´s tumor, DSRCT, normal mesothelium and tumors, ovarian carcinomas
Napsin A (BS10)	MAD-000752QD	Negative	Some lung, renal, thyroid, ovarian carcinomas

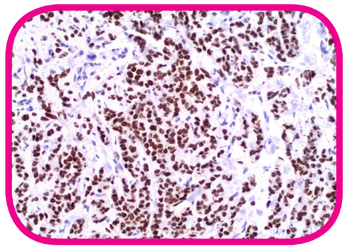

Photo13: GATA3 nuclear staining in a lymphnode metastasis from an occult ductal carcinoma

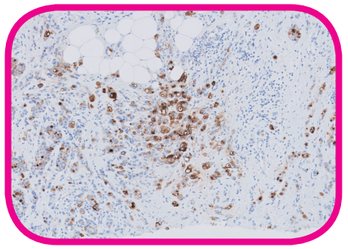

Photo14: GCDFP-15 (BRST2): staining in apocrine metastatic carcinoma

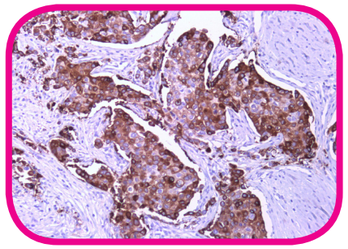

Photo15: Mammoglobin cytoplasm staining in a ductal carcinoma

Chief references

- Peng Y, Butt YM, Chen B, Zhang X, Tang P. Update on Immunohistochemical Analysis in Breast Lesions. Arch Pathol Lab Med. 2017 Jun 2. doi: 10.5858/arpa.2016-0482-RA
- Liu H. Application of immunohistochemistry in breast pathology: a review and update. Arch Pathol Lab Med. 2014 Dec;138(12):1629-42

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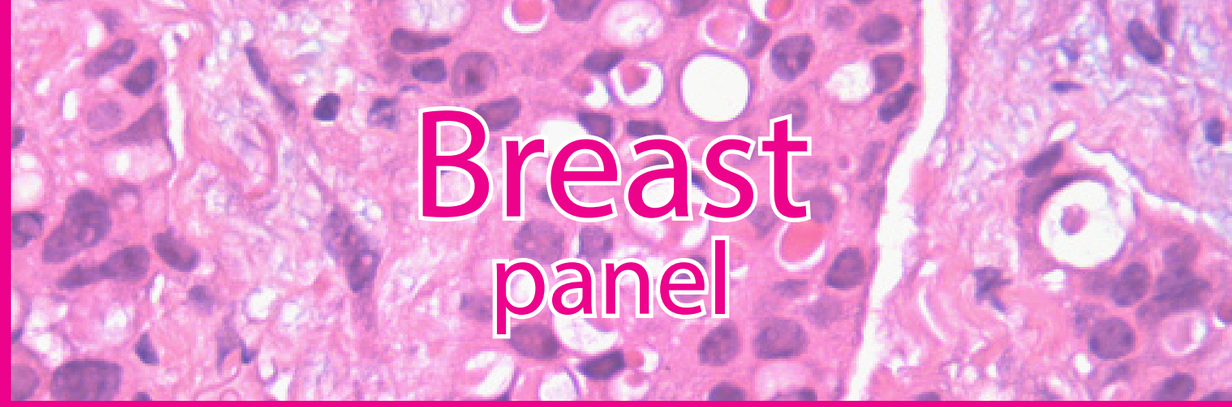

Breast panel

Immunohistochemistry in breast lesions

- Prognostic markers

Antibody	Reference	Luminal A and normal-like	Luminal B	HER2+	TNC*
ER † (SP1)	MAD-000306QD	+	+	-	-
PR ‡ (16)	MAD-000670QD	variable	variable	-	-
CerbB2 (SP3)	MAD-000308QD	-	-/+	+	-
Ki67 (SP6)	MAD-000310QD	low	high	high	high
p53 (SP5)	MAD-000309QD	variable	variable	variable	+

* TNC – triple negative carcinomas
† Estrogen Receptors
‡ Progesterone Receptors

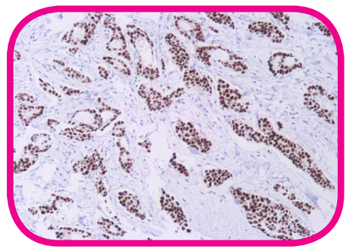

Photo1. Estrogen receptor in a luminal A ductal carcinoma

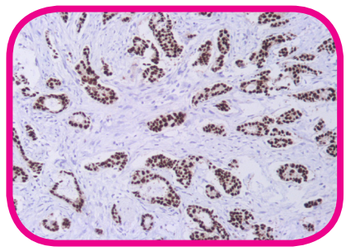

Photo 2. Progesterone receptor in a luminal A ductal carcinoma

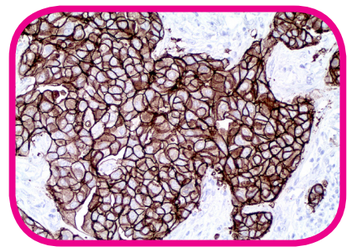

Photo 3. Her2 3+ staining in a HER2 positive ductal carcinoma

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- Distinguish between usual ductal hyperplasia (UDH) and atypical ductal hyperplasia/low-grade ductal carcinoma in situ (ADH/LGDCIS)

Antibody	Reference	UDH	ADH/LGDCIS*
Cytokeratin 5/6 (EP67+EP24)	MAD-000651QD	heterogeneous	negative
Cytokeratin 34betaE12	MAD-009059QD	heterogeneous	negative
Estrogen Receptor (SP1)	MAD-000306QD	heterogeneous	diffusely positive

*basal like DCIS can mimic UDH and be positive for CK5/6 in either a diffuse or patchy pattern

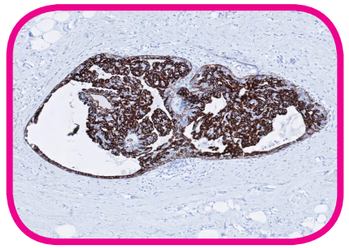

Photo 4. Cytokeratin 5/6 diffuse staining in a UDH

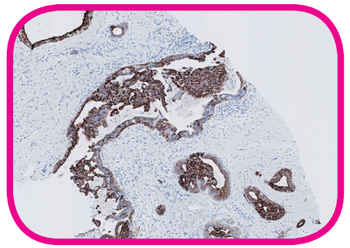

Photo5.Cytokeratin34betaE12diffuse staining in a UDH

- Differentiate between invasive and "in situ" carcinomas - demonstrate the presence of mioepithelial cells*

Antibody	Reference	Invasive carcinoma	"In situ" carcinomas
p63 (4A4)	MAD-000479QD	absent	present
Smooth muscle myosin, heavy chain (EP166)	MAD-000718QD	absent	present
Calponin (EP63)	MAD-000658QD	absent	present
Smooth muscle actin (1A4)	MAD-001195QD	absent	present
CD10 (56C6)	MAD-002022QD	absent	present
S100 (4C4.9)	MAD-001221QD	absent	present
Podoplanin (D2-40)	MAD-000402QD	absent	present
Cytokeratin 5/6 (EP67+EP24)	MAD-000651QD	absent	present
Cytokeratin 14 (LL02)	MAD-005103QD	absent	present

* adenoid cystic carcinomas and metaplastic carcinomas might express mioepithelial markers
*microglandular adenosis has no myoepithelial cells and the cells generally express S100 protein and are negative for ER and PR
* they might be also useful to differentiate papillary lesions

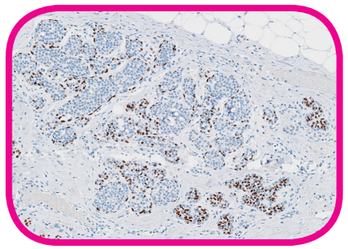

Photo 6: p63 highlighting the mioepithelial cells in an "in situ" lobular neoplasia

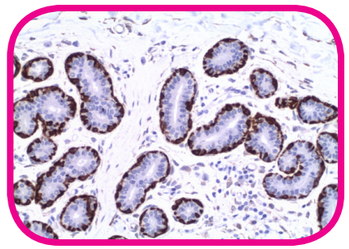

Photo7:Smoothmusclemyosin,heavy chainstainingmyoepithelialcellsof normal breast ducts

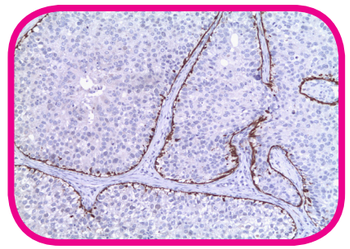

Photo 8: Calponin, highlighting the myoepithelial cells of an "in situ" ductal carcinoma

- Distinguish between ductal and lobular lesions

Antibody	Reference	Ductal	Lobular
E-cadherin (BS38)	MAD-000643QD	Positive	Negative
Delta-cathenin(p120) (EP66)	MAD-000724QD	Membrane positivity	Cytoplasm positivity
Cytokeratin 34betaE12	MAD-009059QD	Absent	Cytoplasm positivity

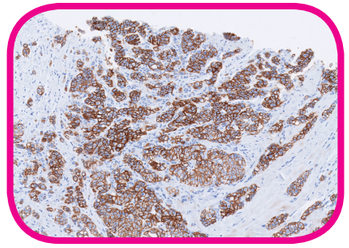

Photo 9: E-cadherin membrane staining in a ductal carcinoma with trabecular and isolated cells pattern of infiltration

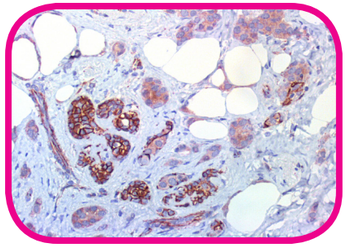

Photo 10: Delta-cathenin (p120) cytoplasm staining in lobular infiltrating carcinoma while normal ducts shows membrane staining

- Characterize triple negative-carcinomas

Antibody	Reference	TNC*
Androgen receptors (SP107)	MAD-000710QD	+/-
EGFR (EP22)	MAD-000664QD	+ majority of basal-like TNC
p53 (SP5)	MAD-000309QD	+ majority of basal-like TNC
p16 INK4A (RUO) (MX007)	MAD-000690QD	+ in more than 70% of basal-like TNC
Cytokeratin 5/6 (EP67+EP24)	MAD-000651QD	More than 60% of the basal-like TNC
Cytokeratin 14 (LL02)	MAD-005103QD	More than 60% of the basal-like TNC
GATA3 (L50-823)	MAD-000632QD	43% to 66% of the cases
E-cadherin (BS38)	MAD-000643QD	Partially lost in poor prognosis tumors
Cyclin-E1 (EP126)	MAD-000713QD	High expression in poor prognosis tumors

* TNC – triple negative carcinomas

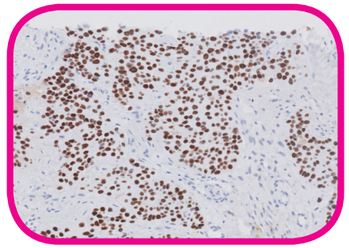

Photo11:p53diffusenuclearstaining in a TNC

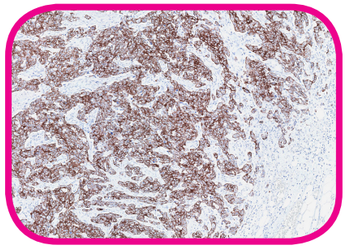

Photo 12: CK5/6 diffuse membrane staining in a TNC