Pretherapy imaging

Conventional imaging

Functional imaging

Mammography , D.B.T.   *Us (Dense breast , Axillary lymph node)*

MRI   *FDG PET /CT*

- *Local - regional staging*

- *Contralateral breast*

- *Appropriate biopsy marker placement*

Preferred in pre-NAT for comparison

May has FP +

Evaluation regional nodal sites (Axillary int. mammary – supraclavicular especially in C.A.B.C.)

RECIST criteria for therapeutic response

CR : *No residual tumor*

PR : *> 30 % ↓in tumor size*

Stable : *< 30 % ↓or < 20 % ↑in tumor size*

Progressive disease : *>20% ↑in tumor size or new*

MRI
Functional imaging post NAT
Highest predictive value for pCR

-DCE MRI + DW MRI

-Volumetric assessment specially in half through MRI is a good predictor of tumor response to therapy

Criteria of rCR

Longest diameter of RT in early phase post contrast $\leq 0/2^{cm}$

Lesion to background parenchyma signal enhancement ration SER $\leq 1/6$

- Heterogeneity or texture analysis (TA)
- Kinetic less helpful

At now , no enhancement or less enhancement than normal parenchyma

(at the site of clip) is the more valuable indicator of rCR

MRI
Functional imaging post NAT
Highest predictive value

MRI has consistently high sensitivity in prediction of pCR (accurate identification on of RT) :

83-92 %   (63-88%)

MRI has intermediate specificity in predicting pCR accurate identification of pCR :

47 – 63 % (55- 91%)

High sensitivity & PPV in detecting pCR in TN & HER2 +

Until now DCE-MRI   did not accurately predict pCR after NAT specially in HR+ tumors but rCR is strongly associated with favorable RFS & OS

MRI
Functional imaging post NAT
Highest predictive value

FN MRI → **FP pCR** → **Underestimation of RT**

-Vascularity ⬇
-Cellularity ⬇
-Crumbling – fragmentation
  (Shrinkage with residue) -
  micronodularity of RT
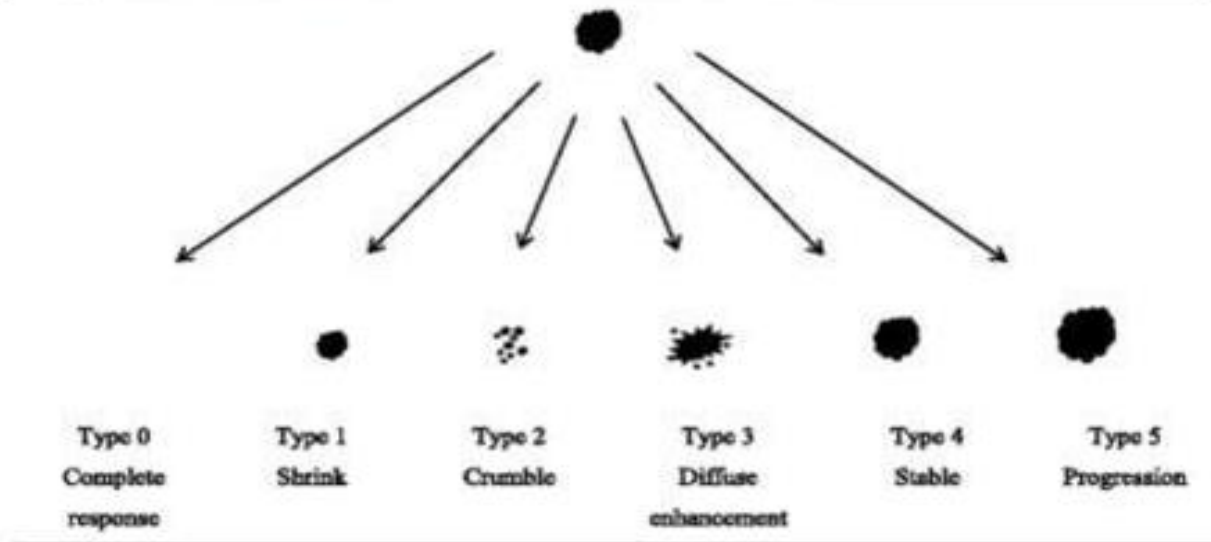- Small RT size $\leq 1^{cm}$

FP MRI → **FN pCR** → **Overestimation of RT**

-Necrosis (granulation tissue)

-Fibrosis

-Inflammation

-DCIS

From: MRI-based response patterns during neoadjuvant chemotherapy can predict pathological (complete) response in patients with breast cancer

| Type 0 Complete response | Type 1 Shrink | Type 2 Crumble | Type 3 Diffuse enhancement | Type 4 Stable | Type 5 Progression |

Magnetic resonance imaging (MRI)-based response patterns of breast carcinomas on breast MRI halfway through and after neoadjuvant chemotherapy

- *Complete response*
- *Shrinkage concentric > 3 ^{mm} without surrounding lesion*
- *Crumble (shrinkage with residual micronodularitions)*
- *Diffuse enhancement in whole quadrant*
- *Stable < 3 ^{mm} shrinkage or ≤ 3 ^{mm} increased*
- *Progressive > 3 ^{mm} increased or new*

Half through MRI good predictor for pCR

Early estimation of tumor response

Stop NAT   *Change in NAT regimen*

Factors that affect the diagnostic accuracy of MRI for therapy response assessment

1) Tumor molecular subtype in
- TN ↑
- HER2 + ↑
- Luminal ↕

2) The type of chemotherapy regimen : Taxane & antiangiogenic drugs → antivascularity →
underestimation   FN ↑

3) Pattern of tumor response
- Crumbling (fragmentation) → underestimation   FN ↑
- Reactive inflammation & fibrosis → overestimation   FP ↑

4) DCIS (Noninvasive) → **positive imaging** → **overestimation**   FP ↑