

## Example questionnaire estimating tumor characteristics

Which characteristics are most important in the discrimination between benign and malign tissue?

|                          | Ranking | Score (max 100) |
|--------------------------|---------|-----------------|
| 1. Mass margins          | 1       | 30              |
| 2. Mass shape            | 2       | 20              |
| 3. Mass size             | 5       | 10              |
| 4. Vascularization       | 2       | 20              |
| 5. Oxygen saturation     | 6       | 0               |
| 6. Localization          | 4       | 10              |
| 7. Mechanical properties | 3       | 10              |

It is possible to provide a score of 0 to 100 per characteristics for each technology (MRI and PAM)

|                          | MRI | PAM |
|--------------------------|-----|-----|
| 1. Mass margins          | 90  | 20  |
| 2. Mass shape            | 95  | 30  |
| 3. Mass size             | 90  | 50  |
| 4. Vascularization       | 90  | 90  |
| 5. Oxygen saturation     | 0   | 70  |
| 6. Localization          | 95  | 90  |
| 7. Mechanical properties | 75  | 70  |

### 1. Mass margins

The margins of a mass have different appearances in images, that may be indicators of malignancy. Different appearances are for example: surrounding, lobular, obscured, turbid or spicular.

### 2. Mass shape

The shape of a mass can also be an indicator of malignancy. Different appearances of masses are for example: round/oval, or lobular. Also the shapes within a mass can be important for diagnosis.

### 3 Mass size

To examine if a lesion has grown with respect to previous images, it may be important to be able to determine the exact size of a mass.

### 4 Vascularization

When a tumor grows, small blood vessels grow around it (angiogenesis) for nutrition supply and waste removal. A number of studies have shown that the degree of vascularity within an invasive breast carcinoma may be of prognostic value. Several other studies have also shown that various premalignant lesions of the breast can induce angiogenesis in animal experimental systems and in the human breast.

### 5 Oxygen saturation

Oxygen saturation is thought to be indicative of the speed with which the tumor is growing: malignant tissues may have lower oxygen saturation due to imbalanced oxygen supply and uptake and increased blood volume due to angiogenesis.

### 6 Location mass

The location of a mass/lesion can be important for diagnosis. Full breast imaging may be an important option, but also zooming in on a specific area and displaying this area with high quality.

### 7 Mechanical properties

Mechanical (or acoustic) properties could provide information about the speed of sound (density) and acoustic attenuation (stiffness). Malignancies have higher speed of sound with respect to healthy surrounding tissues. Higher acoustic attenuation signals are associated with malignancies regardless of the corresponding speed of sound.

## Example questionnaire estimating TPR and TNR

Pooled values of MRI in the diagnostic trajectory of breast cancer

|      |          | Disease |        |       |
|------|----------|---------|--------|-------|
|      |          | Present | Absent | Total |
| Test | Positive | 263     | 94     | 357   |
|      | Negative | 29      | 214    | 243   |
|      | Total    | 292     | 308    | 600   |

Estimated values for PAM

|      |          | Disease |        |       |
|------|----------|---------|--------|-------|
|      |          | Present | Absent | Total |
| Test | Positive | 200     | 94     | 294   |
|      | Negative | 92      | 214    | 306   |
|      | Total    | 292     | 308    | 600   |

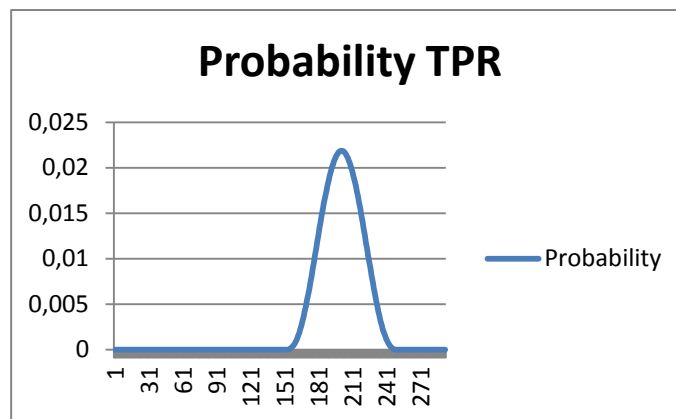
The interval of the TPR ranges from

**Mode (most likely value)**

**Minimum**

**Maximum**

|     |
|-----|
| 200 |
| 150 |
| 250 |



The interval of the TNR ranges from

**Mode (most likely value)**

**Minimum**

**Maximum**

|     |
|-----|
| 214 |
| 150 |
| 290 |

