In the last twenty years MR entered clinical practice in the field of breast imaging, where well-established imaging techniques played a key role for both screening and diagnostic imaging. MR had to highly compete with mammography, which became available on a digital platform including tomosynthesis, and ultrasonography (US), allowing also for contrast-enhanced studies and evolving into automated breast US. Moreover, in the case of a suspected cancer, we are able to easily sample a breast lesion using a needle under mammography (stereotactic) or US guidance. Notwithstanding this apparent closed pathway, breast MR managed to gain an acknowledged role in a series of indications including high-risk screening, prediction and evaluation of response to neoadjuvant chemotherapy, evaluation of patients with breast augmentation or reconstruction; occult primary breast cancer [1]. While new indications are emerging, such as evaluation of lesions with uncertain malignant potential at needle biopsy [2] and nipple discharge [3], preoperative breast MR remains a debated topic due to the risk of overdiagnosis and overtreatment [1, 4, 5]. Looking for high levels of evidence, not only in terms of technical or diagnostic performance but in terms of diagnostic/therapeutic impact and of patient outcome is mandatory, especially in an oncologic field where screening mammography was acknowledged as providing a societal effect in reducing breast cancer mortality.

Multicenter trials should be considered as the most powerful tool for investigate the value of any new health technology, providing results which try to shift from efficacy to effectiveness on a large scale, overcoming the intrinsic limitations and potential biases of single-center studies. In Europe, breast MR has been evaluated on the benchmark of multicenter studies from 1997 to 2012, with results reported in 48 published papers, involving over 11,000 different patients. Taking in consideration the number of the papers, this European experience was mainly based in UK (n=15), Italy (n=8), The Netherlands (n=6), and Germany (n=4). These reports were published more frequently in clinical or non-radiological/imaging journals (n= 26; 54%) than in radiological/imaging journal (n=22; 46%), the former mainly being oncologic or general medical journals, showing the impact of breast MR multicenter research on the entire medical community. These results concern the following topics: screening of women at increased risk of breast cancer (n=24; 50%); diagnostic performance and contrast materials (n=11; 23%); MR guided procedures (n=4; 8%); preoperative MRI (n=3; 6%); other (n=6; 13%).

The large majority of the reports on screening of women at increased risk of breast cancer comes from five relevant studies: MRISC, The Netherlands [6]; MARIBS, UK [7]; EVA, Germany [8]; HIBCRIT-1, Italy [9]; and one study from Norway [10]. The common results of all these studies is that breast MR outperforms mammography for early diagnosis of breast cancer in women at increased risk. These European studies largely contributed to the body of evidence in favor of the use of breast MR for screening high-risk women [11-15]. Notably, two recent studies, the EVA and the HIBCRIT-1, demonstrated that adding mammography and/or US (even if the latter is performed every six months) does not add diagnostic power, as it is shown at ROC analysis for the HIBCRIT-1 study (see Figure), opening a perspective for an MR-only screening of women at high-risk of breast cancer.

A new study (the MIPA project, coordinated by the European Institute for Biomedical Imaging and Research/EuroAIM), including 36 centers (30 of them from Europe), is now ongoing with the aim of comparing surgical and long-term outcomes of two very large concurrent cohorts of women receiving or not receiving preoperative breast MRI [18].