MRI-guided vacuum-assisted breast biopsy (VABB)

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Department of Medical and Surgical Procedures Assessment
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The full HTA report was validated by the Board of the HAS in December 2011.

PROJECT TEAM

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HTA SUMMARY REPORT « MRI-GUIDED VACUUM-ASSISTED BREAST BIOPSY (VABB) »

The following summary report is based on the findings of the full HTA report, entitled “Rapport d’évaluation technologique: Macrobiopsie sous aspiration de lésion de la glande mammaire par voie transcutanée avec guidage”. The full report is published on the HAS website (www.has-sante.fr).

BACKGROUND INFORMATION

MRI-DETECTED BREAST LESIONS

The early diagnosis of small, nonpalpable breast lesions (< 10 mm) is linked to significant improvement in patient prognosis and reduction in cancer mortality. Breast magnetic resonance imaging (MRI) is usually performed when breast triple assessment (clinical examination, mammography and/or ultrasonography imaging, and needle biopsy) proves to be insufficient. Breast MRI is reported to have high sensitivity (88-100%) in the detection of benign and malignant abnormalities that are occult to physical examination and conventional imaging techniques (mammography and ultrasonography). Its specificity, however, remains variable and moderate (37-97%). The growing use of breast MRI for the detection of nonpalpable lesions, occult to conventional imaging, has required its association with an efficient percutaneous histologic tissue-acquisition technique.

PERCUTANEOUS HISTOLOGIC TISSUE ACQUISITION

Percutaneous histologic tissue acquisition not only confirms the presence of malignant lesions but allows for histological characterization of the lesion and procurement of additional information (e.g. histological type and grade, basal subtype, hormone and HER2 receptor status and genetic profiling).

Histologic diagnosis thus helps to distinguish between malignant, high risk and benign lesions. For malignant lesions, percutaneous histologic tissue acquisition allows planning for surgical resection and axillary nodal sampling.

VABB DESCRIPTION

VABB¹ is a technique that has been used in France since 1998. This suction powered system is built with a probe housing a single-use needle. The needle caliber may range from 7 to 12G, allowing for acquisition of 100 to 300 mg of tissue on average. VABB is performed as an ambulatory procedure under local anesthetics. The procedure is generally described as quick, non painful and well-tolerated, leaving scars far smaller than those typically associated with open surgical biopsy.

Depending on the lesion and its radiographic findings, the available imaging techniques used for VABB guidance are mammography, ultrasonography and magnetic resonance imaging.

¹ In the literature, vacuum-assisted breast biopsy may also be referred to as VAB.
OPEN SURGICAL BIOPSY

Open surgical biopsy is the reference standard for evaluating a suspicious breast lesion. The procedure involves removing a sample of tissue, or in some cases the entire lesion (excisional biopsy), through an open incision. The procedure requires hospitalization and is performed under general anesthesia, sedation plus local anesthesia or local anesthesia only. Following tissue acquisition, the incision is closed with sutures.

Findings have shown that approximately 70% of open surgical biopsy result in benign lesions. Thus, a major goal of modern breast medicine is to minimize the number of patients with benign lesions who undergo open surgical breast biopsies for diagnosis. A less invasive method for evaluation of suspicious breast lesions would be preferable if sufficiently accurate.

Current international recommendations are aimed towards ensuring that initial diagnosis of breast cancer be made by percutaneous needle biopsy in over 90% of patients (all techniques considered).

OBJECTIVES

Our objective was to evaluate technical success rate, safety and diagnostic effectiveness of MRI-guided VABB and determine its clinical indications for use. Specific practice and facility requirements for reimbursement in France were equally assessed.

METHODS

The methods used for this assessment report include a systematic review of the evidence and consultation of a multidisciplinary expert panel. This report was validated by the Committee for Assessment of Medical and Surgical Procedures and approved by the HAS Board prior to publication.

1- A literature search was performed, in both the French and English language, with the use bibliographic databases for biomedical and life sciences (search period, with no limit on time coverage: beginning in March 2011 and ending in November 2011).

Publications that were excluded from analysis are as follows:
- Studies that did not address the diagnostic value of MRI-guided VABB;
- Studies that exclusively addressed the excisional properties of MRI-guided VABB as a therapeutic alternative to surgery;
- Studies that exclusively addressed the technical development of MRI-guided VABB (e.g. animal and/or phantom testing, prototype improvement, etc.);
- Studies comparing MRI-guided VABB to other percutaneous techniques and/or other imaging modalities (e.g. MRI-guided core biopsy, stereotactic or ultrasound-guided VABB);
- Studies comparing various MRI-guided VABB techniques and methods (e.g. handheld device vs. console);
- Publications with insufficient data and/or of limited use (e.g. percutaneous or imaging technique insufficiently specified);
- Other: cost-benefit analysis, case studies, editorials, letters, commentaries, general reviews, and non translated articles.
If and when available, the documents with the following characteristics were retained for further examination:

- Systematic reviews, recommendations, HTA reports, etc.;
- Prospective studies;
- Retrospective studies with a sample size exceeding 100 patients at study completion;
- Studies with a publication date no earlier than the year 2000;
- Studies considered methodologically valid for the purpose of this assessment: second-look ultrasound (or mammogram) performed systematically and/or in a majority of the study patients; reporting of the diagnostic reference standard (combination of surgery and follow-up); non subgroup data analysis (e.g. analysis of patients with atypical lobular hyperplasia only).

A total of 5 prospective studies and 1 European consensus meeting satisfied the given criteria.

2- The multidisciplinary expert panel, convened at the HAS in October 2011, was composed of the following health care professionals: radiologists specializing in breast imaging (4), pathologists (3), gynecologists and breast surgeons (4) and medical oncologists (1).

A meeting report documenting the full extent of the discussion was written by the project manager. The meeting report was subsequently reviewed and validated by all panellists. None of the panellists have declared to have any major conflicts of interests with the subject of the assessment.

RESULTS

QUALITY OF THE METHODOLOGY: SELECTED PUBLICATIONS

Overall, the quality of the evidence for the 5 selected prospective studies is poor. The results were not always clearly presented, making it difficult to determine whether or not the studies were likely affected by bias. Important details about patients (e.g. ACR BI-RADS classification) and methods were not systematically reported. Percentage rates were frequently calculated from the raw data found in the articles.

While important information on lesion characteristics were lacking, the clinical situations described in the studies were similar to those found in national and international guidelines regarding the use of breast MRI. The target disease criteria (non palpable lesions detected by MRI only), used to select patients in the studies corresponded to those stipulated by the European consensus meeting. Lastly, the MRI-guided VABB procedure was sufficiently described and reproducible for a large majority of the selected studies.

Regarding the European consensus meeting\(^2\), its objective was to determine technique and optimize quality assurance protocols for MRI-guided VABB. The conclusions published were elaborated from a list of topics open to discussion and comments by a multidisciplinary expert panel. No systematic review was performed and the method of consensus was described in little detail.

TECHNICAL SUCCESS

PRELIMINARY: NONVISUALIZATION OF BREAST MRI LESIONS

MRI is systematically repeated on the day of the scheduled biopsy, prior to tissue sampling. The rate of lesions not found by MRI was reported in 2 studies. Lesion nonvisualization occurred in 14% of cases the day of the scheduled biopsy (85 out of 612 patients).

\(^2\) The meeting convened in 2006 in Nordestedt, Germany with results published in 2009.
Hormonal status (i.e. menstrual cycle, hormone replacement therapy) and confirmation of artifact presence on MRI not requiring biopsy were described as possible sources of lesion nonvisualization. Short-term MRI follow-up was generally recommended for these patients.

**SUCCESS RATE**

Technical success is characterised by the rate of lesions truly sampled by MRI-guided VABB. Lesion sampling is generally appreciated (by the radiologist) by comparing the MRI sequences pre and post biopsy performed on the day of the intervention.

The reported success rate (5 studies) ranged between 86 and 100% (average: 95%). Only 2 studies provided an adequate definition of technical success, one of which was quantifiable.

In addition to the success rate, the authors of all 5 studies reported various situations leading to technical failure. A total of 69 events were found out of 725 referred patients. Technical failure was most commonly associated with problems accessing the lesion with the biopsy needle (11 cases) and bleeding (10 cases). A technical failure could eventually result in suspension or cancellation of the procedure with patient rescheduling.

The number of lesions not sampled by the biopsy technique was infrequent, situated at roughly 2% (14 cases out of 725 patients).

Repeat VABB during the same medical visit was reported by 2 studies (≤5 cases out of 82 lesions). Considering the infrequent reporting and limited data, repeat VABB occurred more commonly when the lesion was not sampled during the first round of tissue acquisition (4 out of 5 cases).

**EXPERT PANEL OPINION**

The panel considers MRI-guided VABB to be a feasible technique. The results of the literature are in accordance with the panel's experience and/or knowledge of the subject. The elevated success rate observed both in the selected studies and in France depends on the fact that this technique is currently practiced in specialized medical centers with experienced and expert staff in breast cancer (i.e. breast MRI, VABB). This expertise is considered crucial to properly perform this diagnostic procedure.

The technical success of MRI-guided VABB depends on 1) thorough verification of the patient medical file by the radiologist and 2) strict adherence to the recommended indications for use: MRI-detected lesions having neither mammographic nor sonographic correlates.

**SAFETY**

The main complications associated with MRI-guided VABB, according to the literature and the expert panel, are presented below. Of note, these complications were neither systematically nor homogenously reported in the selected studies.

**BLEEDING**

The incidence of bleeding ranged between 4 and 6.9% (4 studies). Bleeding resulted in either suspension or premature cancellation of the procedure in 1.4% of cases (10 out of 725 referred patients). In the majority of cases, bleeding subsided with the use of compression and/or conservative methods (3 studies).

**Hematoma**

An incidence of hematoma, greater than 50%, was reported in 2 studies. Based on these findings, hematoma appears to be a frequent complication. Reported in 1 of these 2 studies are hematomas consisting of air and/or fluid, which are not considered to be complications (sensu stricto) by the expert panel. A hematoma rate of 3.5% was observed in a third study,
which included a large sample size (538 patients). Only two patients in this study required surgical removal of the hematoma.

Considering the non systematic and heterogeneous reporting across the 5 studies, the hematoma rate ranged between 3.5 and 71%.

**PAIN AND/OR DISCOMFORT**
Three studies report on pain and/or discomfort but without reference to the use of an intensity rating scale. The incidence of pain and/or discomfort was approximately 7% (1 study). With regard to this study, the procedure was prematurely suspended due to pain. The two other studies reported non numerical descriptions for this complication. Discomfort is described as affecting the cervical region and relating to the immobility required throughout the duration of the procedure.

**EXPERT PANEL OPINION (HAS)**
The panel considers MRI-guided VABB to be a safe diagnostic procedure. Per the panellists’ experience, complications include discomfort and neck pain related to patient positioning and immobility required throughout the procedure (rather frequent), followed by non complicated hematoma (frequent) and bleeding at the puncture site requiring suspension of the procedure (rare).

**DIAGNOSTIC EFFECTIVENESS**

**SUSPICIOUS LESIONS**
The results for suspected or confirmed malignancy at VABB, for which surgical excision was undertaken, are presented in table 1.

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3 Non complicated hematoma was defined by the panel as superficial with an ability to regress quickly.
Table 1. Results for suspicious lesions surgically excised.

<table>
<thead>
<tr>
<th>MRI-guided VABB results</th>
<th>Range, % (Global rate, %)</th>
<th>Total number of lesions</th>
</tr>
</thead>
<tbody>
<tr>
<td>malignant lesions</td>
<td>18 à 32 (26)</td>
<td>177</td>
</tr>
<tr>
<td>high risk lesions</td>
<td>3 à 13 (4)</td>
<td>29</td>
</tr>
<tr>
<td>discordance*</td>
<td>4 à 14.8 (1)</td>
<td>9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Histopathological results following surgery</th>
<th>Range, % (Global rate, %)</th>
<th>Total number of lesions</th>
</tr>
</thead>
<tbody>
<tr>
<td>malignant lesions</td>
<td>25 à 34 (28)</td>
<td>173</td>
</tr>
<tr>
<td>high risk lesions</td>
<td>2 à 9 (3.2)</td>
<td>20</td>
</tr>
<tr>
<td>concordance rate‡</td>
<td>76 à 95 (95)</td>
<td>181</td>
</tr>
<tr>
<td>underestimation rate</td>
<td>3 à 24 (5)</td>
<td>10</td>
</tr>
</tbody>
</table>

Notes: (*) Surgical excision was not systematically indicated for cases of discordance between MRI and VABB. (†) Two studies were excluded from the pooled results for the following reasons: a) all patients underwent surgical excision including patients presenting benign concordant lesions (Liberman et al. 2003), b) only partial histopathological results were reported for surgically treated suspicious lesions (Hauth et al. 2008). (‡) This rate does not include histopathological results for lesions that were discordant between MRI and VABB and that had undergone surgical excision.

Concerning the biopsy and surgical histopathology results, the main findings are a 95% concordance rate and a 5% underestimation rate (table 1).

For lesions that were diagnosed as ADH⁴ and DCIS⁵ by MRI-guided VABB, the rate of underestimation ranged between 25-67% and between 0-14%, respectively. A total of 8 ADH underestimations were observed out of 24 diagnosed (33%) and 4 DCIS underestimations out of 72 (5,6%).

ADH underestimations were not considered to be missed cancers because current medical practice recommends surgically treating these types of high risk lesions.

LESIONS LIKELY TO BE BENIGN
The results for lesions likely to be benign at MRI-guided VABB (benign concordant between MRI and VABB), for which MRI follow-up was carried out, are presented in table 2.

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⁴ ADH: atypical ductal hyperplasia.
⁵ DCIS: ductal carcinoma in situ.
The main finding in Table 2 is the 0% cancer rate detected at MRI follow-up. This result must nonetheless be weighted against a 12% lost to follow-up and a variable follow-up period, ranging from 3 to 24 months.

Overall, 68% of sampled lesions were found to be benign. This rate corresponds to the rate generally cited in the literature (e.g. general reviews).

**EXPERT PANEL OPINION (HAS)**
With regard to the high concordance and low underestimation rate, the panel considers MRI-guided VABB to be an effective and valid technique for the diagnosis of malignant and high-risk breast lesions. These results are in accordance with the panel’s experience and/or knowledge of the subject.

However, based on the results of the studies, the validity of MRI-guided VABB for the diagnosis of benign lesions is considered less certain by the panel. Overall, the studies report a limited number of patients at follow-up. Contrary to the study results, the cancer rate at MRI follow-up in France, while not null, remains satisfactory at a low of 1 to 2%.

While this technique no longer resides in the research and development stage, its use should nevertheless be restricted to specialized medical centers. The panel considers this technique to play a significant role in the diagnostic strategy of non-palpable MRI-detected lesions. In the case of benign concordant lesions adherence to follow-up guidelines is critical.

**DIAGNOSTIC STRATEGY – INDICATIONS FOR USE**
The European consensus meeting recommends full imaging work-up, following existing standards, before establishing an indication for MRI-guided VABB. If the lesion can be satisfactorily demonstrated by mammography or ultrasound, then these should be the biopsy guidance methods of choice. Conversely, if a lesion is deemed to require MR guidance for biopsy then this should not be replaced by other methods.

The European consensus meeting recommends MRI-guided VABB for lesions classified as BI-RADS IV or BI-RADS V. In individual cases, biopsy may also be appropriate for BI-RADS III lesions.

### Table 2. Results for benign concordant lesions followed by MRI.

<table>
<thead>
<tr>
<th>MRI-guided VABB results (5 studies; 675 lesions sampled)</th>
<th>Range, % (Global rate, %)</th>
<th>Total number of lesions</th>
</tr>
</thead>
<tbody>
<tr>
<td>benign concordant lesions</td>
<td>60 à 70 (68)</td>
<td>462</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MRI follow-up results (3 to 24 months) (4 studies; 442 lesions sampled)</th>
<th>Range, % (Global rate, %)</th>
<th>Total number of lesions</th>
</tr>
</thead>
<tbody>
<tr>
<td>lost to follow-up</td>
<td>0 à 29 (12)</td>
<td>54 lesions</td>
</tr>
<tr>
<td>lesions confirmed benign</td>
<td>71 à 100 (88)</td>
<td>388</td>
</tr>
<tr>
<td>cancer</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
EXPERT PANEL OPINION (HAS)
The panel considers that MRI-guided VABB is appropriate for use in BI-RADS IV and BI-RADS V lesions. In the case of BI-RADS III lesions, the panel advanced three major clinical situations justifying the use of this biopsy technique:

- ipsilateral breast lesion in the presence of cancer if expected to modify treatment
- contralateral breast lesion in the presence of cancer
- presence of risk factors (e.g. high risk for breast cancer)

GENERAL REQUIREMENTS AND CONDITIONS FOR USE
This section of the report is based on both the European consensus meeting results and the HAS expert panel opinion. For a complete overview of the topics discussed in the European consensus meeting, it is recommended to refer to the original article. The information presented below briefly summarizes a limited number of these topics. Areas of disagreement were systematically modified by the HAS expert panel, resulting in conclusions that were considered more appropriate in the French context.

CONTRAINDICATIONS
According to the European consensus meeting, MRI-guided VABB is contraindicated in the following situations:

- Patients with a known contraindication to MRI;
- Patients with significant renal impairment and for whom contrast medium would be contraindicated;
- Patients with a known allergy to local anaesthetic or to contrast medium.

The patient should be able to tolerate immobilization in a prone position for the duration of the procedure (approximately 60 minutes).

PRECAUTIONS
According to the panel, MRI-guided VABB precautions include:

- lesions within close proximity to the chest wall
- coagulation disorders and anticoagulation treatment (provided a low risk of haemorrhaging)
- patients with breast implants

The initial patient work-up should include clinical and imaging data (mammogram, ultrasound, MRI) and exams performed post MRI (second-look ultrasound). Dialogue between the radiologist and the clinician is systematically required prior to performing the biopsy procedure.

To optimize patient care, practitioners in France must have access to a local network of specialized centers practicing MRI-guided VABB. Furthermore, the patient should be provided with a thorough explanation of the diagnostic procedure and associated complications. Patient information should be provided prior to and the day of the procedure.

EQUIPMENT
The breast biopsy system should allow optimal access with sufficient breast stabilization and reproducible guidance of the interventional equipment into the lesion. The biopsy system and its software should be compatible with the available MRI system.

If a fiducial marker is used, subsequent mammography in two orthogonal planes should be performed to document its position, as soon as is reasonably practical.
PROCEDURE TIME
The time required to sample one lesion is approximately 1 hour. This time includes patient preparation and installation, the procedure itself (pre-biopsy MRI sequence, lesion sampling, marker placement, and post-biopsy MRI sequence) and cleaning of the MRI room which is done in parallel to patient bandaging. Sampling a second lesion usually requires an additional 30 minutes, totalling 1½ hours.

MRI IMAGE ACQUISITION PRE AND POST BIOPSY
Prior to lesion sampling the patient must undergo MRI breast imaging studies with and without contrast medium. Acquisitions are repeated following contrast injection. After lesion sampling, one sequence (at minimum) must be performed to demonstrate the location of the biopsy site in relation to the targeted lesion (sequence performed without contrast). In case of lesion nonvisualization the day of the procedure, the patient must be quickly rescheduled for another MRI exam (usually within the same week).

BIOPSY SAMPLING
MRI-guided VABB should include:
- use of an 11-gauge needle at minimum;
- prior to sampling, targeting should be checked by re-imaging the patient with the probe introducer in the target position;
- the average number of cores taken should be not less than 24 for an 11-gauge needle (or equivalent volume if a large needle is used);
- marking of the biopsy site should be systematic with the use of a radio opaque clip following lesion sampling;
- if more than one lesion is being biopsied, a separate probe should be used for each lesion to avoid cross-contamination.

POST-PROCEDURE SURVEILLANCE
Patient surveillance of 30 minutes is considered sufficient in the absence of complications. The patient should be accompanied home. Operating a motor vehicle or performing activities that solicit pectoral muscles should be avoided in the short term.

MRI FOLLOW-UP
The panel unanimously considers a follow-up scheduled between 6 to 12 months as inappropriate. The panel suggests a follow-up at a shorter timeframe of 3 to 6 months. At-risk patients that present with benign results should be closely monitored so as not to adversely affect prognostic outcome. If the MRI follow-up confirms benign results, the patient may return to regular screening. If the MRI follow-up results are uncertain or suspicious, the patient should be provided with appropriate care and monitoring. It is recommended that this MRI follow-up be performed in the same institution whenever possible.

EXPERIENCE AND TRAINING (ADAPTED TO THE FRENCH CONTEXT)
Initial: experience in stereotactic guided VABB and breast MRI; validation can be obtained by performing 3 MRI-guided VABB procedures in a specialized center and under the supervision of an experienced breast radiologist.\(^\text{6}\)
Maintenance: 10 MRI-guided VABB procedures performed annually by the team.

\(^{6}\) For France, the HAS expert panel suggested less stringent training requirements than the European consensus meeting. The panel considers that training and performing MRI-guided VABB is neither complicated nor difficult in itself. In addition, the number of procedures required for validation must be aligned with the number of procedures performed annually. Finally, the risk of an inappropriate and/or excessive use of MRI-guided VABB should be of little concern; mainly because the procedure is rather time-consuming and is only recommended in a limited number of indications.
HISTOPATHOLOGY OF MRI-GUIDED VABB

The histopathological examination should be performed by a pathologist experienced in breast pathology. It is essential that patient data (i.e. clinical, imaging) accompany the biopsy sample submitted for examination. A minimum of 3 sections is necessary for analysis of breast tissue sampled from a VABB device. The pathologist should have access to a specialist opinion when needed. A thorough pathology report should be written-up.

CONCLUSIONS

The following conclusions are based on both the results of the literature analysis and the opinion of the multidisciplinary expert panel convened by the HAS.

Considering the relatively high prevalence of benign lesions (approximately 70%) and the effectiveness of MRI-guided VABB (high concordance rate, low underestimation rate, and low cancer rate at follow-up), this percutaneous breast biopsy technique appears appropriate for use in the following indications:

MRI-detected lesions (without mammographic/sonographic correlates) for lesions classified by the ACR BI-RADS MRI lexicon:
- BI-RADS V
- BI-RADS IV
- BI-RADS III (select patients)

In the case of BI-RADS III lesions, the main clinical situations justifying the use of MRI-guided VABB are as follows: ipsilateral breast lesion in the presence of cancer if expected to modify treatment, contralateral breast lesion in the presence of cancer, or presence of risk factors.

Frequent complications associated with MRI-guided VABB include discomfort and neck pain related to patient positioning and immobility, followed by non complicated hematoma and bleeding.

This technique is contraindicated in the following clinical situations: patients with a known contraindication to MRI, patients with significant renal impairment and a contrast medium contraindication, and patients with a known allergy to local anaesthetic or contrast medium.

The initial patient work-up should include clinical and imaging data (mammogram, ultrasound, MRI) and exams performed post MRI (second-look ultrasound). Dialogue between the radiologist and the clinician is systematically required prior to performing this biopsy procedure.

The patient should be provided with a thorough explanation of the diagnostic procedure and associated complications. Patient information should be provided prior to and the day of the procedure.

This biopsy technique should be performed by centers experienced in breast radiology (i.e. stereotactic guided VABB, breast MRI). The histopathological examination should be performed by a pathologist experienced in breast pathology. It is essential that the pathologist have access to patient data (i.e. clinical, imaging) as well.

In France, it is considered important that practitioners and patients have access to this technique and are aware of its availability. The national target population is estimated to fall between 100 and 700 patients (based on the annual activity of 14 specialized centers in the country).
MRI-guided VABB is a diagnostic procedure only and must not be regarded as a therapeutic method. In case of confirmed malignancy or pre-invasive neoplasia, surgical re-excision with a therapeutic objective is required. In case of non neoplastic benign lesions, a follow-up MRI 3 to 6 months after biopsy is recommended in France.

This assessment resulted in a general description of the MRI-guided VABB procedure:
- pre-biopsy MRI sequence (with contrast medium)
- VABB sampling
- post-biopsy MRI sequence (usually without contrast medium)
- post-biopsy bandaging

In France, these steps take approximately one hour to perform. HAS suggests that local health care professionals aim towards standardizing MRI-guided VABB in France. Further detailing of the procedure is preferable.

The HAS recommends the use of MRI-guided VABB in patients with MRI detected lesions, without sonographic/mammographic correlates. With respect to the ACR BI-RADS-MRI classification system, MRI-guided VABB is indicated in the following lesions: BI-RADS IV and BI-RADS V. MRI-guided VABB may also be appropriate for BI-RADS III lesions in select patients.
REFERENCES

PROSPECTIVE STUDIES (INCLUDED IN THE ANALYSIS)


EUROPEAN CONSENSUS CONFERENCE (INCLUDED IN THE ANALYSIS)


The complete bibliographic citation list used to prepare and write the summary report may be consulted by referring to the full French HTA report published on the HAS website (www.has-sante.fr). The report is entitled “Rapport d'évaluation technologique: Macrobiopsie sous aspiration de lésion de la glande mammaire par voie transcutanée avec guidage”.