INTRODUCTION

Primary operable breast cancer has been treated by neoadjuvant systemic therapy (NST) to make breast conservation possible in some patients with operable disease who otherwise would require a mastectomy. Nowadays, the surgical defect is expected to be as limited as possible. Neoadjuvant systemic therapy has become widely accepted as the treatment of choice for patients with locally advanced disease, large inoperable tumors or inflammatory disease to convert inoperable to operable primary tumors. Although the terms primary systemic therapy and preoperative therapy are more accurate descriptions of this treatment, NST is the term that has come into broad use, and that is the term we will use here (Kaufmann et al., 2003, 2006).

DIAGNOSIS

The diagnosis of breast cancer has to be histologically confirmed by core cut biopsy. It is recommended to take 3–5 core biopsies for diagnosis and to evaluate predictive and prognostic markers that are necessary for treatment decision. Imaging is an important adjunct to neoadjuvant therapy. Before starting therapy, it helps to identify the extent of the disease; during therapy it can be used to evaluate response, and after NST, it may assist with evaluation of the extent of residual tumor and to guide surgery. The imaging techniques used in the baseline examination that best delineate the malignancy should be repeated during treatment to document tumor response. Clinical examination based on palpable change in tumor size is the most common and easiest method for monitoring treatment effect and has been acknowledged as a factor of prognostic importance. It has been demonstrated that the treatment effect is frequently overestimated with clinical examination, whereas the effect is usually underestimated with ultrasound measurement (von Minckwitz et al., 2005).

It seems advisable to perform ultrasound and clinical examination in combination with mammography for response evaluation to rule out over- and under-estimation
of response. In the case of ambiguous results, multicentricity, and lobular invasive cancers, a quantitative contrast-enhanced MRI is helpful (Manton et al., 2006). Some studies have shown MRI to be superior to mammography, ultrasound, and clinical examination in evaluating the extent of the tumor (Esserman et al., 1999). The agreement of pathologic residual tumor size with mammography or sonography residual tumor is moderate, especially in lobular invasive cancers (Chagpar et al., 2006; Peintinger et al., 2006). At the time of surgery, MRI may, therefore, help to identify residual disease more accurately and assist guiding the surgeon. However, changes in imaging generally manifest themselves later than changes in underlying tumor function, e.g., vascular density and permeability (Wasser et al., 2003). Newer techniques, such as proton magnetic resonance spectroscopy, diffusion weighted imaging, interstitial fluid pressure, and Doppler ultrasound are under investigation (Mardor et al., 2003; Taghian et al., 2005).

TREATMENT DECISION

Treatment decision is based on various known predictive and prognostic markers. If the aim is to target the most dangerous tumor cells, it is reasonable to believe that NST is appropriate for each patient who has an indication to receive adjuvant therapy. Groups of patients need to be identified to whom it is appropriate to offer NST after histological diagnosis of breast cancer. Offering NST to a patient means providing comprehensive information on the risks and benefits of systemic treatment in general as well as its schedule, and an explanation for what purpose this treatment should be given before surgery.

For operable breast cancer, NST may be offered to all patients who are expected to be candidates for adjuvant systemic chemotherapy. As a prerequisite, all necessary information for this decision should be available at the time of the recommendation. According to current recommendations adjuvant systemic treatment decisions are based on endocrine responsiveness of the tumor, lymph node involvement, age and menopausal status at the time of diagnosis, tumor size, grade, and HER-2/neu receptor status. Whereas steroid hormone receptors and grade can be determined accurately on the tissue from the diagnostic core biopsy, information on lymph node involvement and tumor size usually will be derived from imaging tests and will have some degree of uncertainties. Sometimes, in borderline cases (e.g., a postmenopausal patient with a T 1–2, hormone sensitive tumor) reliable information on lymph node status is warranted for decision. This recommendation for the primary use of chemotherapy is based on a set of randomized trials showing equal efficacy for the post- and preoperative use of non-anthracycline or anthracycline containing regimen (Fisher et al., 1998; Scholl et al., 1994). Equal long term efficacy has also been shown for the post- and preoperative use of docetaxel in one trial.

There is a group of selected patients who are expected to be candidates for adjuvant endocrine therapy alone. This addresses mainly postmenopausal, frail patients where surgery alone or in combination with chemotherapy is associated with an increased risk due to age and/or relevant life expectancy limiting comorbidities. However, there is no information