

time from diagnosis to surgery (52). Black and So (53) and D'Auria et al. (54) point out that if ineffective chemotherapy is delivered, there is a delay in providing surgery. In other words, attempts at providing chemotherapy that prove ineffective can potentially reduce survival.

### b. More Accurate Staging

An advantage of adjuvant staging is that it enables more accurate staging of tumors (55,56,57,58). The particular stage of a tumor is routinely assessed for cancer patients, and is used as part of the entry criteria in clinical trials, and may be correlated with specific courses of treatment. However, if patients have been treated with chemotherapy or radiation therapy before surgery, staging of the tumor will not likely be accurate.

### c. Drugs That Require Chronic Treatment, for Example, for 5 Years

An advantage of adjuvant therapy over neoadjuvant therapy is where the drug requires

chronic administration. In this situation, adjuvant therapy must be used. For example, surgery for breast cancer may be followed by 5 years of administering tamoxifen (59,60,61). In detail, extended adjuvant endocrine therapy (tamoxifen) is recommended for postmenopausal women with endocrine-responsive breast cancers. The reverse type of study design, that is, neoadjuvant therapy for 5 years, followed by surgery, would not make any sense.

## III. TWO MEANINGS OF THE WORD ADJUVANT

The term *adjuvant* has two different meanings. One of the meanings, which is the subject of this chapter, means therapy such as chemotherapy or radiotherapy that is given after surgery. The second meaning relates to vaccines. In the context of vaccines, adjuvant refers to a drug that provokes a nonspecific increase in immune response, that is, a specific drug that provokes an increase in immune response

<sup>52</sup>So A. Perioperative chemotherapy: the case for adjuvant chemotherapy for muscle-invasive bladder cancer. *Can. Urol. Assoc. J.* 2008;2:225–7.

<sup>53</sup>Black P, So A. Perioperative chemotherapy for muscle-invasive bladder cancer. *Can. Urol. Assoc. J.* 2009;3 (6 Suppl. 4):S223–7.

<sup>54</sup>D'Auria G, Ciprotti M, Conte D, et al. Neo-adjuvant and adjuvant chemotherapy in bladder cancer. *Ann. Oncol.* 2007;18(Suppl. 6):vi162–3.

<sup>55</sup>Witjes JA, Comperat E, Cowan NC, et al. Guidelines on muscle-invasive and metastatic bladder cancer. *European Association of Urology*; 2015 (60 pp.).

<sup>56</sup>Lorusso V, Silvestris N. Systemic chemotherapy for patients with advanced and metastatic bladder cancer: current status and future directions. *Ann. Oncol.* 2005;16(Suppl. 4):iv85–9.

<sup>57</sup>Tsakamoto T, Kitamura H, Takahashi A, Masumori N. Treatment of invasive bladder cancer: lessons from the past and perspective for the future. *Jpn J. Clin. Oncol.* 2004;34:295–306.

<sup>58</sup>Jacobs BL, Lee CT, Montie JE. Bladder cancer in 2010: how far have we come? *CA Cancer J. Clin.* 2010;60:244–72.

<sup>59</sup>Kennecke HF, Olivotto IA, Speers C, et al. Late risk of relapse and mortality among postmenopausal women with estrogen responsive early breast cancer after 5 years of tamoxifen. *Ann. Oncol.* 2007;18:45–51.

<sup>60</sup>Brewster AM, Hortobagyi GN, Broglio KR, et al. Residual risk of breast cancer recurrence 5 years after adjuvant therapy. *J. Natl Cancer Inst.* 2008;100:1179–83.

<sup>61</sup>Abrial C, Durando X, Mouret-Reynier MA, et al. Role of neo-adjuvant hormonal therapy in the treatment of breast cancer: a review of clinical trials. *Int. J. Gen. Med.* 2009;2:129–40.