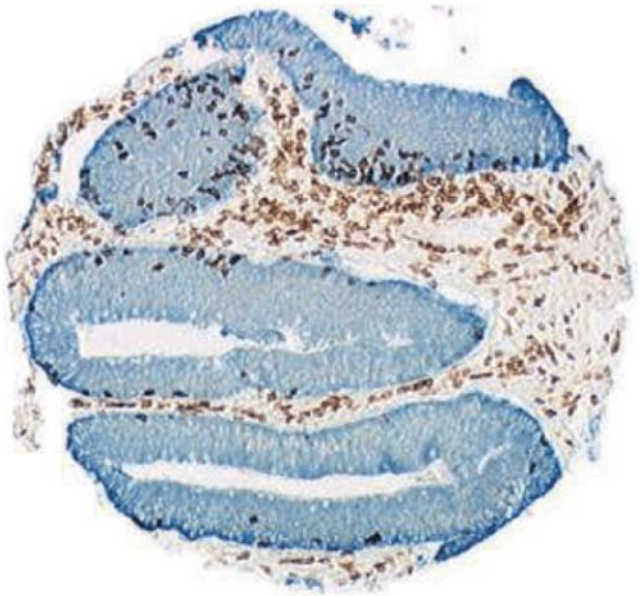

FIGURE 19.4 T cells (brown in original article) and tumor cells (blue in original article). The antibodies used for tagging T cells were antibodies that specifically bind CD3, CD8, CD45RO, and GZMB (granzyme B). The antibodies used for tagging tumor cells were antibodies against cytokeratin, and cytokeratin-8.

infiltrate of T cells had a 5-year survival rate of 73%, compared with 30% for patients with low densities of T cells around the tumor. Thus, the nature of a patient's immune response to a given tumor can be a good prognostic marker, where the prognostic value of this particular marker may be greater than that provided by traditional staging methods.

Immune cells have been used as biomarkers for predicting survival to colon cancer in studies by other investigators, for example, Pagès et al. (75), Pagès et al. (76), and Camus et al. (77).

8. Tumor-Infiltrating T Cells as a Prognostic Biomarker for Colon Cancer—The Morris Study

Morris et al. (78) evaluated the prognostic significance of lymphocytes, as markers, in colon cancer patients treated with surgery alone, or with surgery followed by 5-fluorouracil. Increased lymphocyte infiltration was associated with better survival in patients treated by *surgery plus 5-fluorouracil* (HR = 0.52). But increased lymphocyte infiltration was not associated with better (or worse) survival in patients treated by *surgery alone* (HR = 0.98). The study

[75]Pagès F, Kirilovsky A, Mlecnik B, et al. In situ cytotoxic and memory T cells predict outcome in patients with early-stage colorectal cancer. J. Clin. Oncol. 2009;27:5944–51.

[76]Pagès F, Berger A, Camus M, et al. Effector memory T cells, early metastasis, and survival in colorectal cancer. New Engl. J. Med. 2005;353:2654–66.

[77]Camus M, Tosolini M, Mlecnik B, et al. Coordination of intratumoral immune reaction and human colorectal cancer recurrence. Cancer Res. 2009;69:2685–93.

[78]Morris M, Platell C, Iacopetta B. Tumor-infiltrating lymphocytes and perforation in colon cancer predict positive response to 5-fluorouracil chemotherapy. Clin. Cancer Res. 2008;14:1413–7.