immunocompromised mouse. Since the tumors are taken directly from patients, the issues of long term propagation and growth conditions are eliminated from the equation, providing a model that is closer to the clinical situation. The adoption of this model, however, has been slowed by the significant expense and technical difficulties associated with using patient-derived material.[53]

Irrespective of the source of the tumor cells, in practice, tumor cells (or a tumor section if the material is patient-derived) are inserted under the skin of a mouse. The tumor cells (or tumor fragment if patient-derived) are allowed to establish themselves over a short period of time (typically 5–15 days), and then treatment with a test compound is initiated. Changes in tumor volume over time can be used to determine whether or not compounds display any degree of efficacy as antitumor agents. In the absence of an effective treatment, tumors will grow without restriction, while compounds capable of halting or slowing disease progression will slow or stop tumor growth. It is worth noting that these experiments are time consuming and costly, as differences in tumor size and growth rates are typically measured over weeks or months (up to 4 months, sometimes longer), not hours or days.[54]

Mouse Allograft Tumor Model

One of the drawbacks of the mouse xenograft model is the use of cross-species transplantation (human tumor cells to a mouse host). The experiment requires the use of immunocompromised mice in order to ensure that the human tumor cells will not be rejected by an immune response mounted by the host animal. Of course, this is not consistent with the natural progression of cancer in humans. The allograft mouse model provides an opportunity to study potential antitumor agents in the presence of a normal immune system. In this model, immunocompetent mice (those with an intact immune system) are subjected to experimental conditions similar to those employed in the xenograft model, but the human tumor cells are replaced with mouse tumor cell lines (an intraspecies transplantation rather than an interspecies transplantation). Candidate compounds can be introduced in the same manner as described for the mouse xenograft model, and their efficacy can also be determined in the same manner (changes in tumor size over time). The presence of a fully functioning immune system makes the allograft model more similar to the human condition than the xenograft model.

Of course, the use of mouse cancer cells in and of itself is a significant issue. Candidate compounds that show positive efficacy in a mouse allograft model have only demonstrated that they are capable of treating cancer in mice, not humans. Subtle differences between the mouse and