



FIGURE 101e-8 A two-dimensional map of genes mutated in colorectal cancer. The two-dimensional landscape represents the positions of the RefSeq genes along the chromosomes and the height of the peaks represents the mutation frequency. On the top map, the taller peaks represent the genes that are commonly mutated in colon cancer, while the large number of smaller hills indicates the genes that are mutated at lower frequency. On the lower map, the mutations of two individual tumors are indicated. Note that there is little overlap between the mutated genes of the two colorectal tumors shown. These differences may represent the basis for the heterogeneity in terms of behavior and responsiveness to therapy observed in human cancer. (From LD Wood et al: *Science* 318:1108, 2007, with permission.)

to help the patients and their physicians make treatment decisions. Personalized medicine is an exciting new avenue for cancer treatment based on matching the unique features of a tumor to an effective therapy, and this concept is in the process of changing our approach to cancer therapy in fundamental ways. On a cautionary note, gene expression can vary enormously within a single person's cancer and at different anatomic sites in the patient. We have not yet determined whether such clonal variation within an individual tumor will interfere with the goal tailoring therapy to a particular patient's tumor.

THE FUTURE

A revolution in cancer genetics has occurred in the past 25 years. Identification of cancer genes has led to a deep understanding of the tumorigenesis process and has had important repercussions on all fields of cancer biology. In particular, the advancement of powerful techniques for genomewide expression profiling and mutation analyses has provided a detailed picture of the molecular defects present in individual tumors. Individualized treatment based on the specific genetic alterations within a given tumor has already become possible. Although these advances have not yet translated into overall changes in cancer prevention, prognosis, or treatment, it is expected that breakthroughs in these areas will continue to emerge and be applicable to an ever-increasing number of cancers.