



FIGURE 14.1. A qualitative model that illustrates some of the complex interactions that sustain a functioning cell. Shown is a model of a human cell with a cytoplasmic membrane, cytoplasm, and nucleus. In cells, a network of proteins causes changes in cell behavior by changing gene expression, protein translation, and protein function. External signals (e.g., growth factors, hormones, and cytokines) influence cells via membrane-bound receptors (e.g., Frizzled and E-cadherin), which in turn trigger interconnected signaling pathways that lead to changes in cell behavior. *Arrows* and *lines* represent interactions (e.g., positive and negative regulation of one protein by another or binding of proteins to nucleic acids).

14.1, redrawn from Rutherford S., *Nat. Rev. Genet.* 4: 263–274, © 2003 Macmillan, www.nature.com