

## 7.013

### Solutions: Oncogenes and Tumor Suppressors

a) Yes. One mutant copy of the activated *ras* oncogene can transform a cell into a tumor cell, regardless of the other *ras* genes.

b) No. The cell still has two functional copies of the *Rb* gene. Any good copy of the *Rb* gene will produce the Rb protein that will halt cell cycle progression when necessary.

c) Yes. One copy of the EGFR gene that encodes a mutant, constitutively active receptor can transform a cell into a tumor cell, regardless of the other EGFR genes.

d) Yes. This could produce a self-stimulation cell. The introduced copy of the *epo* gene could allow the cell to produce and secrete the Epo protein. The Epo protein could then bind to the Epo receptor on the erythroid stem cell and stimulate cell division.

e) Yes. The cell would now have two functional copies of the *Rb* gene and two mutations are required to produce a tumor cell phenotype.