E0042

The Alpha-V-Beta-3 Integrin Molecule. K. Brenner, D. Brown, S. Flaaten, T. Grewal, L. Hirschmann, L. Moon, M. Roberts and L. Stewart, Whitefish Bay High School SMART Team, Whitefish Bay, WI 53217, Science Mentors: Drs. Peter and Debra Newman, Blood Research Inst., Milwaukee,WI 53226-0509.

We modeled the molecule integrin $\alpha_V ß_3$ based on the 1JV2.pdb. Integrins are involved in helping blood cells to stick to solid surfaces and to one another. The $\alpha_V ß_3$ integrin helps cells to stick tightly to, and then migrate through, the material that lines blood vessels, which may help cancer cells "metastasize," or leave the bloodstream. A related integrin, $\alpha_{IIb}\beta_3$, helps platelets to stick to one another using, as a bridge, fibrinogen, which exists in the plasma and is the major ligand for $\alpha_{IIb}\beta_3$. Because platelets must stick to one another, or aggregate, to close up a wound, bleeding disorders result when mutations in $\alpha_{IIb}\beta_3$ make platelets unable to aggregate due to a lack of the integrin or to defects within it that make the portion of the integrin located outside of the cell membrane unable to bind fibrinogen. Defects within the $\alpha_{IIb}\beta_3$ integrin can also make it easier for platelets to stick together. When this happens, platelets can form a clump that's big enough to close up a blood vessel, which can cause a heart attack or stroke. Understanding the integrin structure may lead to more effective treatments dealing with either generating or dissolving platelet clumps.