Two ways VEGF-A builds a vessel

On page 1163, Gerhardt et al. present a mechanism to explain the function of VEGF in angiogenesis. Their findings implicate a specialized cell at the tips of vessels in guiding the growth of new sprouts, with cell mass provided by the division of different cells that lie further back.

The authors examined angiogenesis in mice retina. Retinal Tip cell (green) filopodia follow VEGF-A–expressing astrocytes (red).

The relationship between time until catastrophe and growth velocity is the same in the presence (circles) or absence (triangles) of force.

... before addition of the next tubulin dimer could provide more time for structural changes (perhaps altered connections between protofilaments, for example) that might lead to catastrophe.

... By sensing force, microtubules can respond to changes in cell shape. For instance, in fission yeast, the nucleus sits in the middle of the cell. Instability as microtubules contact the edges of cells may create the space necessary for nuclear repositioning; otherwise, the nucleus might get stuck somewhere in a corner of the cell. Forces exerted by centrosomes, kinetochores, or molecular motors may similarly affect microtubule dynamics during cell division. That microtubules themselves sense and respond to forces means no localized catastrophe-promoting factors are required. However, microtubules that persist for long periods of time, such as those at the kinetochore, may require stabilizing factors on their growing ends to resist force-induced catastrophes.