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### **Simple Physics in Diseases and Embryonic Development of the Eye<sup>1</sup>**

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While molecular-level regulation within cells during embryonic development is highly complex, the physical mechanisms which translate this intracellular information into multicellular physical structure at the tissue level are often surprisingly simple. I will discuss an example where regulation of cell-cell contact energies is primarily responsible for robust and evolvable regular patterns, the organization of the ommatidia and supporting cells into the regular tiling characteristic of the *Drosophila* eye and another example where adhesion failures in the human retina result in choroidal neovascularization leading to blindness. In both cases, simulations based on materials-science techniques can help us understand the patterning mechanisms and the reasons for their robustness and failures. Such simulations are easy to extend to other developmental phenomena and to development-related diseases like cancer.

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