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Vascular retraction driven by matrix softening[1]

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We recently discovered we can directly apply physical forces and monitor the downstream responses in a living organism in real time through manipulation of the blood vessels of a marine organism called, *Botryllus schlosseri*. The extracellular matrix (ECM) plays a key role in regulating vascular growth and homeostasis in *Botryllus,* a basal chordate which has a large, transparent extracorporeal vascular network that can encompass areas >100 cm^2. We have determined that lysyl oxidase 1 (LOX1), which is responsible for cross-linking collagen, is expressed in all vascular cells and is critically important for vascular maintenance. Inhibition of LOX1 activity *in vivo* by the addition of a specific inhibitor, ß-aminopropionitrile (BAPN), caused a rapid, global regression of the entire vascular bed, with some vessels regressing >10 mm within 16 hrs. In this talk, I will discuss the molecular and cellular origins of this systemic remodeling event, which hinges upon the ability of the vascular cells to sense and respond to mechanical signals, while introducing this exciting new model system for studies of biological physics and mechanobiology.

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