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Mechanical influences in bacterial morphogenesis and cell division

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Bacterial cells utilize a ring-like organelle (the Z-ring) to accomplish cell division. The Z-ring actively generates a contractile force and influences cell wall growth. We will discuss a general model of bacterial morphogenesis where mechanical forces are coupled to the growth dynamics of the cell wall. The model suggests a physical mechanism that determines the shapes of bacteria cells. The roles of several bacterial cytoskeletal proteins and the Z-ring are discussed. We will also explore molecular mechanisms of force generation by the Z-ring and how cells can generate mechanical forces without molecular motors.