Priming umbilical cord cells to kill disease-causing bacteria

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Video Abstract

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Abstract

New research suggests that cells from the umbilical cord can be programmed to gobble up and kill disease-causing bacteria. When deployed in rats, such cells could effectively reduce signs of acute lung injury, pointing to an alternative route for fighting lung disease in humans. These are mesenchymal stromal cells. Their chameleon-like ability to form into bone, cartilage, or fat in the body has made them valuable for tissue repair and regeneration. But recent studies have shown that these cells can also help boost the immune system. They do this by releasing bioactive pockets of cellular matter that are believed to signal immune cells like macrophages to action. In rats with bacterial lung disease, that ability appears to provide significant relief. Researchers found that injecting mesenchymal cells from human umbilical cords could reduce signs of pneumonia caused by *E. coli* and increase animal survival. What's more, they could actually enhance that effect. The ability to call the immune system to arms, it turns out, is something mesenchymal cells "learn" to do in a microenvironment marked by injury or disease. So before they injected them into rats, the research team flooded mesenchymal cells with a small protein secreted during normal immune responses. That essentially primed the cells for disease-fighting action. Results showed that this baiting of sorts could strengthen the cells' capacity to reduce symptoms of pneumonia—enlisting the help of macrophages to engulf and kill *E. coli* cells. It's still unclear whether those findings will carry over to clinical lung diseases in humans, such as acute respiratory distress syndrome. But they are encouraging. At the very least, they support the use of this unique priming approach to develop new types of treatment.