

# Col2 Transgenic Rabbit

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## Technology description

### Summary

[Dr. David Butler](#) of the University of Cincinnati and [Dr. Jeffrey Robbins](#) Cincinnati Children's Hospital and Medical Center have collaborated to create a new research tool – a transgenic rabbit in which cells fluoresce when the collagen 2 (Col2) gene is being expressed. Animal models are utilized for a variety of applications in the fields of engineering, orthopedic and medical research. They have allowed scientists to better understand the natural history of disease, to develop new and improved surgical techniques, to predict the effect of a given treatment or surgical procedure and to critically develop and evaluate implants, a basic element of modern orthopedics. In every aspect of biomedical research, the use of animal models constitutes an essential step that leads to the eventual application of newly acquired information to the human patient.

Patients in the US sustain more than 32 million injuries to tendons and ligaments at a cost of \$30 billion each year. Many of these injuries occur where type I collagen fibers insert into fibrocartilage (including type II collagen synthesized by Col2) and bone (type I collagen; Col1). Type II collagen, which adds structure and strength to connective tissues, is found primarily in cartilage. Cartilage includes the articulating tissue lining the ends of bones within joints, the shock absorbing pads within the knee known as the menisci, and the center portion of the discs between the vertebrae in the spine. By exploring when the Col2 gene is expressed, we can better understand how the body reacts to certain injuries and how it heals. There currently exists a mouse model which expresses fluorescent proteins based on changes in Col1 and Col2 gene expression. Although an excellent genetic tool, the mouse is too small to perform reproducible surgeries to study the repair of many orthopedic tissues.

To better understand the growth and development and healing mechanisms of orthopedic tissues, Dr. Butler and Dr. Robbins have developed a transgenic rabbit which expresses fluorescent proteins based on changes in Col2 gene expression. Rabbits are larger animals than mice, making it possible to more easily perform reproducible surgeries. The fluorescent expression lasts 24 hours, so there is ample time to see the results. The Col2 transgenic rabbit will provide a straightforward tool to study the spatial and temporal patterns of Col2 expression during normal development and repair of collagenous tissues.

### Institution

[University of Cincinnati](#)

## 联系我们



叶先生

电话 : 021-65679356

手机 : 13414935137

邮箱 : yeyingsheng@zf-ym.com