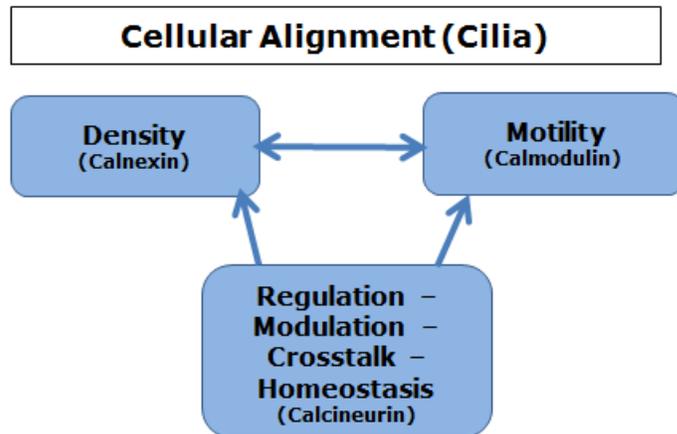


Three forms of CTG exist; alpha - beta and gamma. Epigenetic modeling can verify their links to calnexin - calmodulin and calcineurin for cellular adhesion and cilia.

Refer to the following for discussion.



Note: Numerous alternative designations exist for these epigenetic signaling molecules. Each were assigned as research addressed each type of cell in isolation. We can provide these designations to interested parties.

With minimal effort, bioinformatic search will link Interleukin 6 to having calcium - magnesium and chloride as elemental constituents. The relationship between calnexin and calmodulin can be explained to anyone with good knowledge of cellular biology.

Summary

Hip replacement disrupts cell alignment and activates calcium-magnesium based cytokines to restore cilia alignment.

<https://medicalxpress.com/news/2018-06-urinary-markers-bone-problems-hip.html>

## Urinary markers predict bone problems after hip replacement

June 6, 2018, Wiley

In a study published in the *Journal of Orthopaedic Research*, investigators have identified urinary markers that differentiate total hip replacement patients who eventually develop bone tissue destruction, or osteolysis, from patients who do not.

For the study, researchers used a repository of 24-hour urine samples collected prior to surgery and annually thereafter in 26 patients, 16 who developed osteolysis and 10 who did not.

The levels of certain markers helped the investigators identify patients at risk for osteolysis long before the emergence of signs through imaging tests—in some cases 6 years before a diagnosis was made. Although single markers showed moderate accuracy, the combination of  $\alpha$ -CTX, a bone resorption marker, and IL-6, an inflammatory marker, led to high accuracy in the differentiation of patients who eventually developed osteolysis from those with no signs of osteolysis.

"We are hopeful that early biomarkers for implant loosening will alert surgeons to be especially vigilant in their follow-up of at-risk patients and may eventually lead to treatments delaying or avoiding the need for revision surgery," said senior author Dr. D. Rick Sumner, of Rush University Medical Center, in Chicago. "Perhaps even more intriguing is that the two biomarkers we identified also differed before surgery among patients who eventually developed peri-implant osteolysis and those who did not, supporting the concept that other researchers have proposed of genetic risk factors for loosening."

**Explore further: HRT cuts risk of repeat knee/hip replacement surgery by 40 percent**

**More information:** Ryan D. Ross et al, Discovery of biomarkers to identify peri-implant osteolysis before radiographic diagnosis, *Journal of Orthopaedic Research* (2018). DOI: [10.1002/jor.24044](https://doi.org/10.1002/jor.24044)

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