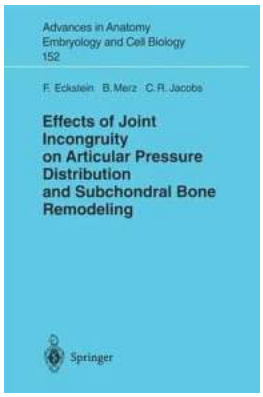
Effects Of Joint Incongruity On Articular Pressure Distribution And Subchondral

Joint incongruity refers to the improper alignment or fit between the articulating surfaces of a joint. When joint surfaces do not fit properly, it can result in a variety of biomechanical alterations, which can have significant effects on articular pressure distribution and subchondral tissues.

Articular Pressure Distribution

Articular pressure distribution refers to the way in which forces are distributed across the articulating surfaces of a joint. In a congruent joint, where the surfaces fit perfectly, the pressure is evenly distributed. However, when joint incongruity is present, the pressure distribution becomes uneven.

This uneven pressure distribution can lead to various complications. For example, areas of increased pressure can cause excessive mechanical stress on the articular cartilage, leading to its degeneration and potentially resulting in conditions such as osteoarthritis.



Effects of Joint Incongruity on Articular Pressure Distribution and Subchondral Bone Remodeling (Advances in Anatomy, Embryology and Cell Biology Book 152)

by F. Eckstein (Softcover reprint of the original 1st ed. 2000 Edition, Kindle Edition)

★★★★★ 5 out of 5

Language	: English
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Text-to-Speech	: Enabled
Enhanced typesetting	: Enabled

Print length	: 205 pages
Screen Reader	: Supported

Furthermore, the altered pressure distribution can affect the lubrication of the joint, as the synovial fluid may not be distributed evenly. This can further contribute to cartilage damage and joint degeneration.

Subchondral Effects

The subchondral bone, which lies just beneath the articular cartilage, is also affected by joint incongruity. This bone is responsible for providing structural support to the overlying cartilage and absorbing shock during joint movement.

When pressure distribution is uneven due to joint incongruity, certain areas of the subchondral bone may be subjected to increased stress. This can result in the development of subchondral bone cysts, bone edema, or even bone necrosis.

Moreover, the altered pressure distribution can lead to changes in the trabecular microarchitecture of the subchondral bone. This can affect its mechanical properties and compromise its ability to withstand loading forces, further contributing to joint degeneration.

Impact on Joint Stability

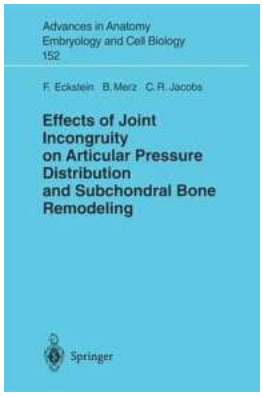
Joint incongruity can also have implications for joint stability. When the articulating surfaces do not fit properly, it can result in joint laxity or instability. This can lead to an increased risk of joint dislocation or subluxation.

In addition, the altered pressure distribution can affect the distribution of muscle forces around the joint. This can lead to imbalances in muscle activity, further compromising joint stability.

Joint incongruity can have significant effects on articular pressure distribution and subchondral tissues. The uneven pressure distribution can contribute to cartilage degeneration, while subchondral bone can develop cysts or undergo microarchitectural changes. Furthermore, joint stability can be compromised, increasing the risk of dislocation or subluxation.

Understanding the effects of joint incongruity is crucial for healthcare professionals involved in the diagnosis and management of joint conditions. Further research is needed to develop effective interventions that can mitigate these effects and promote improved joint health.

Keywords: Joint incongruity, articular pressure distribution, subchondral tissues, joint stability, osteoarthritis



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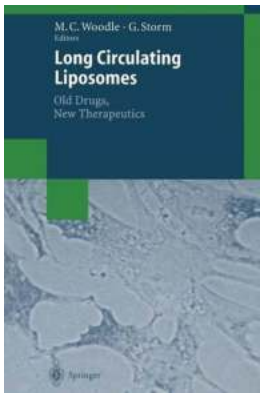
The objective of the present work is to review the existing literature on joint incongruity, cellular mechano-transduction, and computer simulations of mechano-adaptive bone remodelling, and to quantitatively assess the effect of incongruity on load transmission and subchondral mineralisation. Idealised computer models of incongruous joints and a specific anatomically based model of the humero-ulnar joint articulation were analysed with the finite element method, and the results directly compared with experimental and morphological data.



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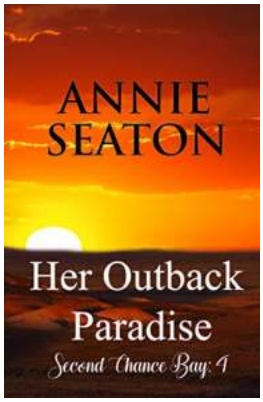

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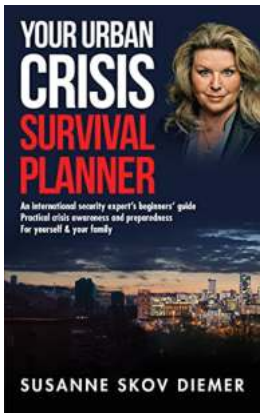

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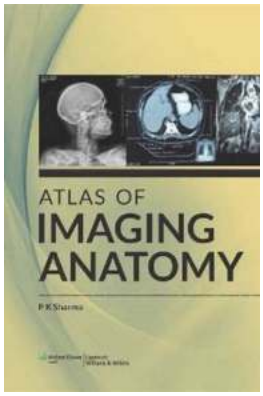

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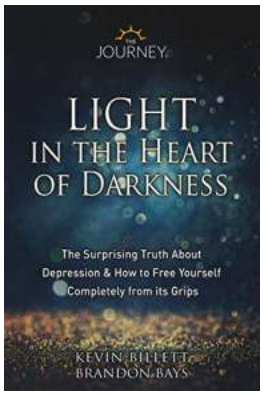

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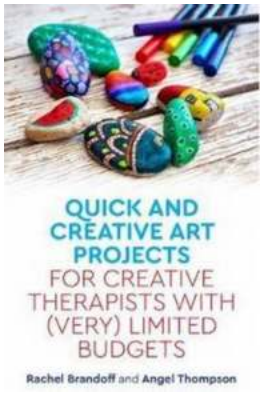

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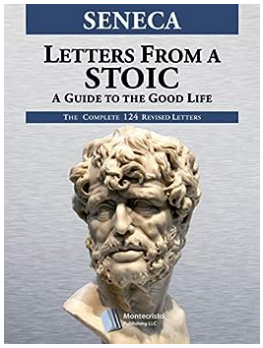

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