

Osteochondritis Dissecans (OCD) Predisposes Patients to Osteoarthritis

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Abstract

On average, osteochondritis dissecans (OCD) impacts 9 in 100,000 children and young adults. Osteochondritis dissecans (OCD) is a rare joint disorder in which a lack of blood supply to a joint results in bone fragmentation, followed by the loosening and breakage of the surrounding cartilage. Osteoarthritis is a joint disease where the structural integrity of the joint is compromised, resulting in joint pain. Studying the predisposition to osteoarthritis following OCD diagnosis is important as this can help inform patients on the best course of treatment. This review sought to examine the rate of incidence of osteoarthritis in patients with OCD by reviewing studies carried out over decades, comparing similar mechanisms of action between the two diseases, examining heritability, and how the joint being compromised plays a role in the development of osteoarthritis in OCD. The results show a relationship between patients developing osteoarthritis following OCD diagnosis, which is dependent on the type of treatment used to treat the bone fragmentation. While not many genetic studies have been carried out in humans, animals with similar knee joints have shown OCD is heritable, such that similar mutations in two genes relating to short stature, also contribute to a heightened risk of OCD development. These findings help to clarify how OCD predisposes patients to the development of osteoarthritis. While osteoarthritis shows to be an unavoidable diagnosis following OCD, hopefully the different rates of incidence of osteoarthritis following OCD treatment help better educate patients on how to decrease their risk of developing osteoarthritis.

Osteochondritis Dissecans Treatment Options

There are a few different routes patients can take to alleviate symptoms related to OCD and decrease risk of osteoarthritis development at different rates.

1. Fragment excision
2. Fragment preservation
3. Chondral defect grafting
4. Knee replacement

Acknowledgement

I want to thank Dr. Nahmani for his mentorship and support throughout this entire process, from editing my review to final touches for SAMURS. I also want to thank Dr. Heller for her guidance while working to prepare for SAMURS. This has been a very educational and informational experience.

Pathophysiology of Osteochondritis Dissecans

There are a few different factors that contribute to the presence of OCD in the knee joint, with some being genetic and others because of human action. This leads to visible alteration of the knee joint.

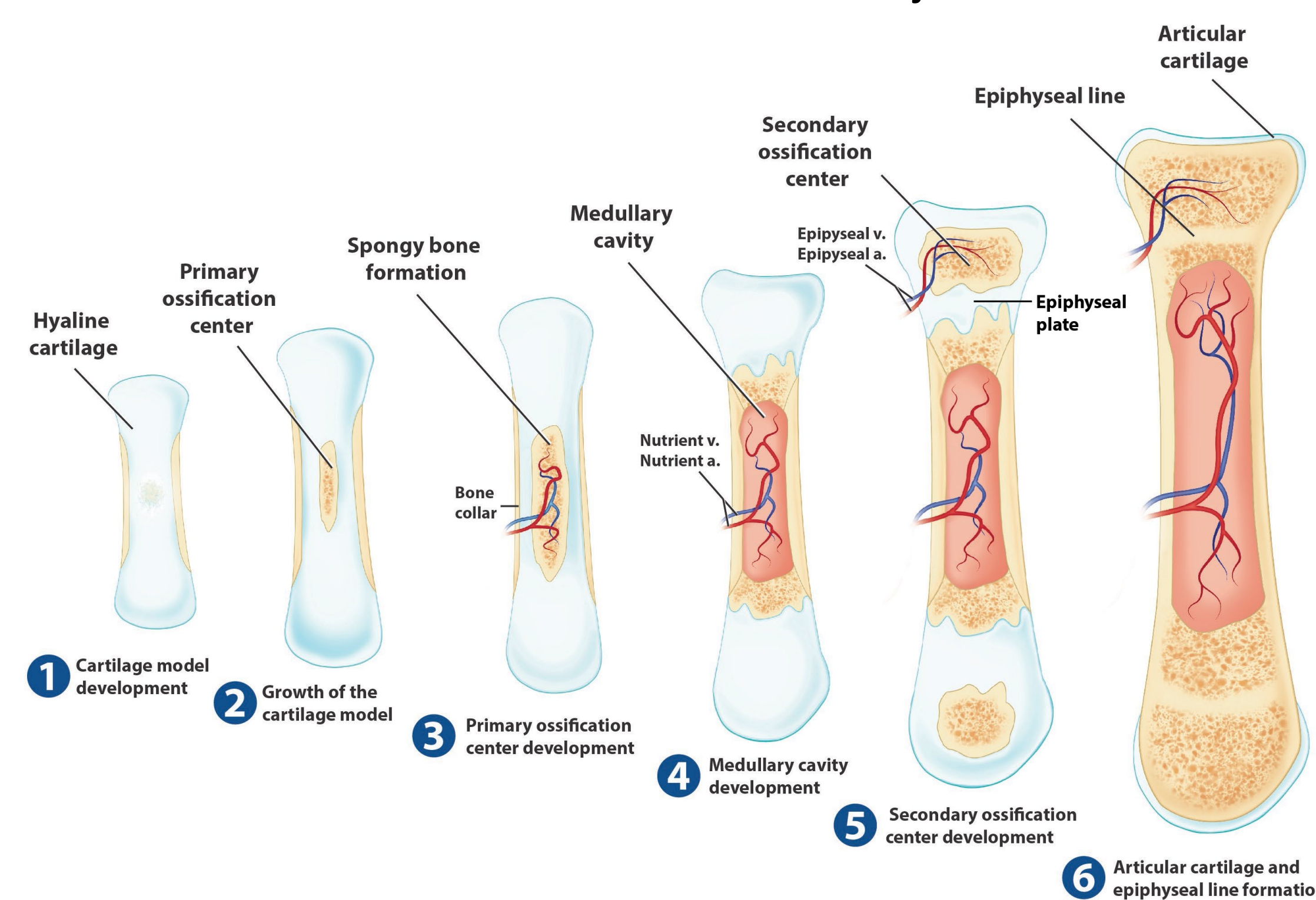


Figure 1. Diagram representing endochondral ossification.

Lange, Jennifer. "5.4: Bone Formation and Development." *Medicine LibreTexts*, 22 June 2022, med.libretexts.org/Bookshelves/Anatomy_and_Physiology/Human_Anatomy_%28Lange_et_al.%29/05%3A_Bone_Tissue_and_Skeletal_System/5.04%3A_Bone_Formation_and_Development.

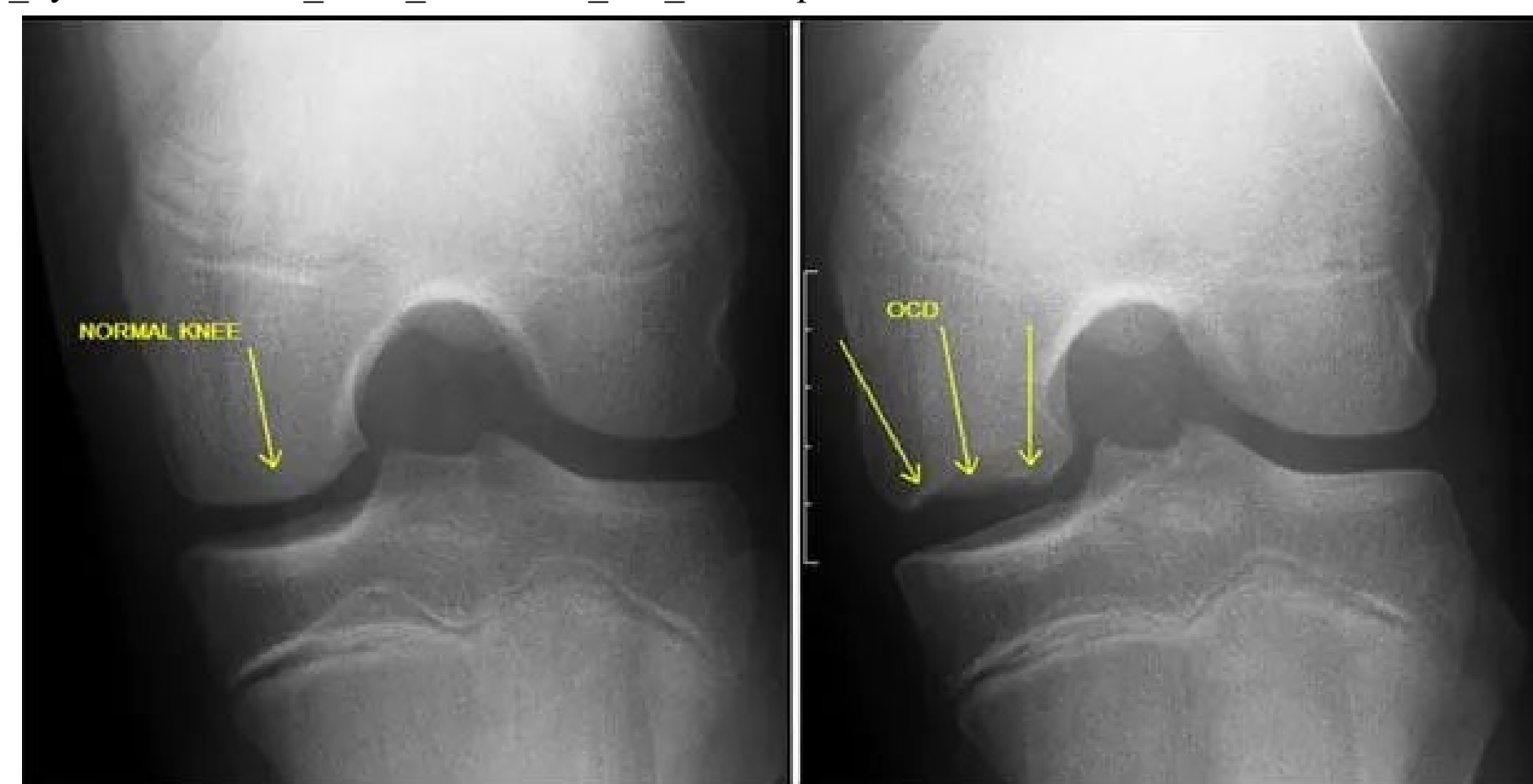


Figure 2. X-ray images of a normal knee joint (left panel) versus a knee joint impacted by OCD (right panel).

Wall E. 2023 Apr. Osteochondritis Dissecans | Symptoms, Diagnosis & Treatment. www.cincinnatichildrens.org. https://www.cincinnatichildrens.org/health/oosteochondritis-dissecans.

Pathophysiology of Osteoarthritis

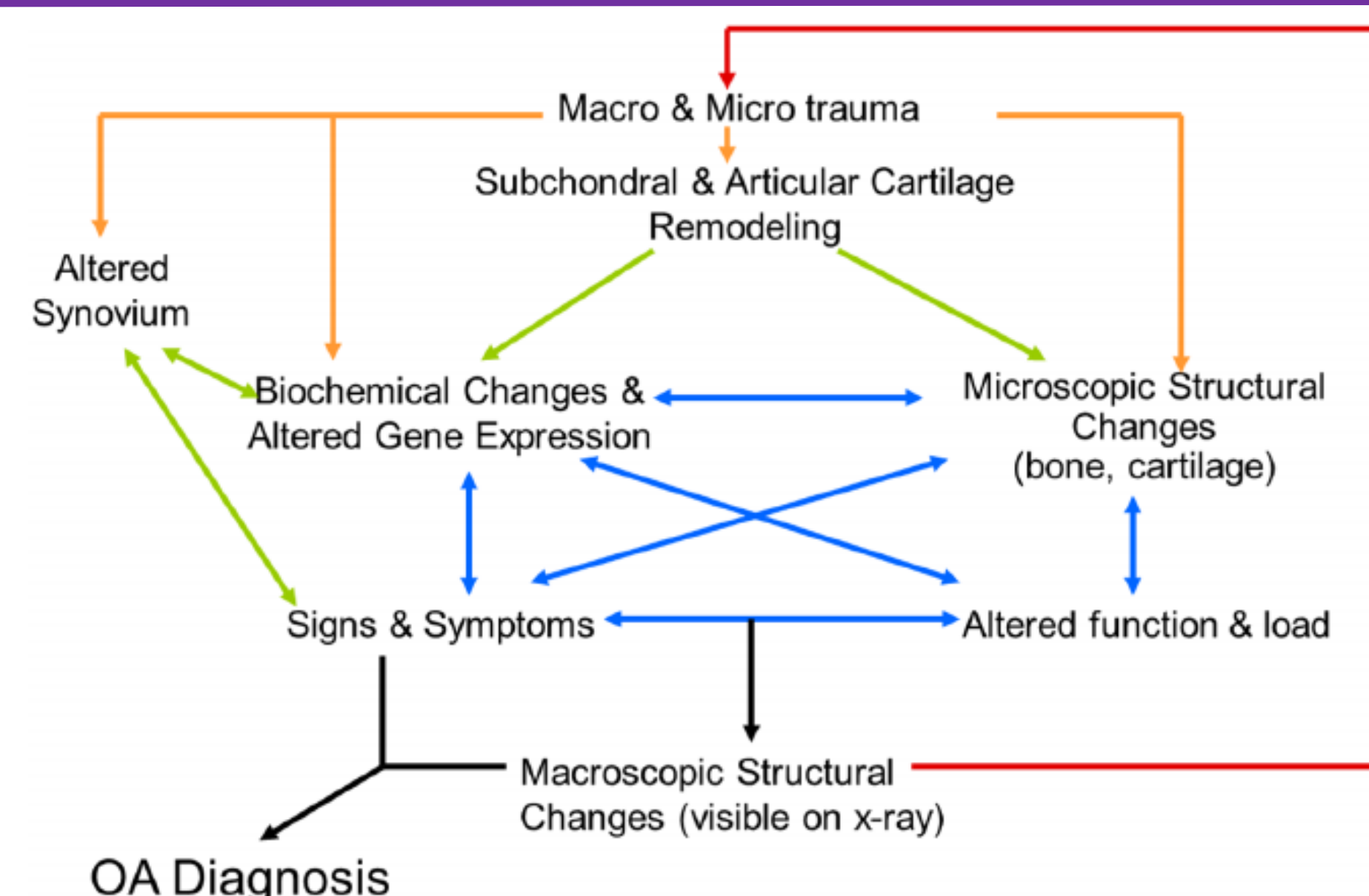


Figure 3. Schematic showing the general pathophysiology of osteoarthritis, Cattano N, Barbe M, Massicotte V, Sitler M, Balasubramanian E, Tierney R, Driban J. 2013. Joint trauma initiates knee osteoarthritis through biochemical and biomechanical processes and interactions. *OA Musculoskeletal Medicine*. 1(1). doi:https://doi.org/10.13172/2052-9287-1-1-383.

Risk factors in combination with the pathophysiology of osteoarthritis can lead to increased experience of osteoarthritis related symptoms such as increased inflammation of the joint, and pain.

Osteoarthritis Incidence Linkage to OCD

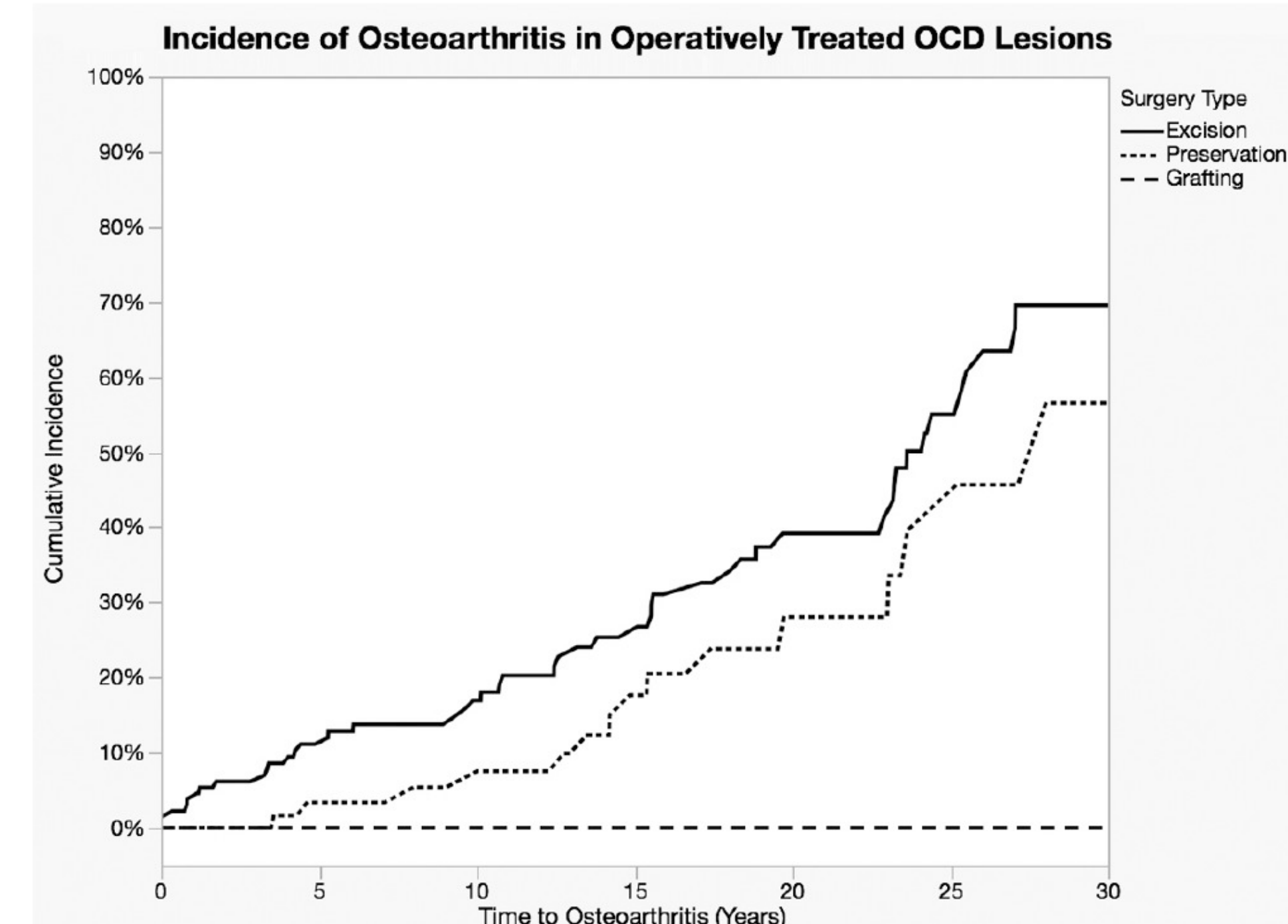


Figure 4. Graph of cumulative incidence of arthritis following OCD treatment.

Sanders, Thomas L., et al. "High Rate of Osteoarthritis after Osteochondritis Dissecans Fragment Excision Compared with Surgical Restoration at a Mean 16-Year Follow-Up." *The American Journal of Sports Medicine*, vol. 45, no. 8, 18 Apr. 2017, pp. 1799-1805, https://doi.org/10.1177/0363546517699846.

Aside from experiencing the same symptoms post-diagnosis including, but not limited to joint weakness, decreased range of motion, swelling at the joint, and joint pain, there is a high rate of osteoarthritis incidence following OCD diagnosis.

Conclusions

OCD patients are more likely to develop osteoarthritis following OCD diagnosis than a "normal" patient would be, due to similar mechanisms that compromise cartilage structural integrity, as well as similar symptoms that worsen the joint condition. Chondral defect grafting and knee replacements yield the best results for patients hoping to decrease their risk of developing osteoarthritis from OCD, however joint preservation is a secondary solution in the event that better treatment options are not affordable.

Future Directions

- Long term study (30 years) following a control group, as well as OCD diagnosed individuals to observe and compare osteoarthritis rate of incidence, ideally from age ~50 to age ~80 as this is when most arthritis diagnoses occur.
 - Hopefully providing a more reliable data set for correlation of OCD and osteoarthritis.
- In favor of a shorter-term study, examining osteoarthritis incidence following OCD from 70-79 could work as this age range is where most osteoarthritis diagnoses occur. A control group would help the data collected be most accurate.



References

