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Oxidized Zirconium vs Cobalt-Chromium TKA: Surface roughness of retrieved femoral components

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Introduction

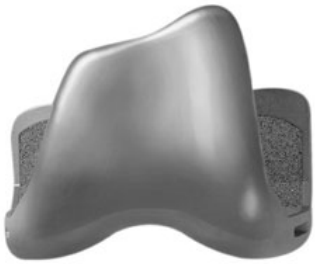
- Oxidized zirconium (OxZr) was introduced as an alternative bearing surface to CoCr alloys in TKAs
- Simulator studies have shown that the surface roughness of OxZr does not change during testing, while the surface roughness of CoCr increases [1]
- Retrieval studies have shown that PE components paired with OxZr have less surface damage than those paired with CoCr femoral components [2]
- While in vivo performance of CoCr is well established, little is known about the in vivo performance of OxZr [3]

Objective

To evaluate the surface characteristics of OxZr and CoCr retrieved TKA femoral components

Methods

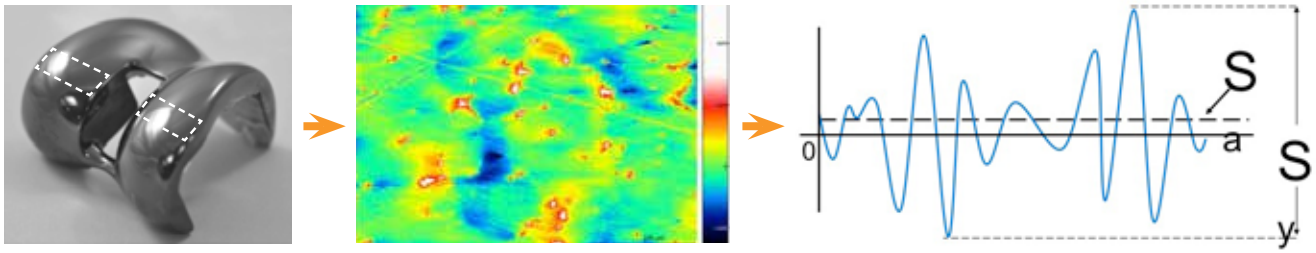
Qty – 10 OxZr
Retrieved femoral components



Qty – 10 CoCr
Retrieved femoral components

Implants matched on patient demographics: LOI, Age, Revision Diagnosis and BMI

Surface roughness measured with non-contact white light profilometer
(MicroXAM Optical Profiler, ADE Phaseshift, AZ)

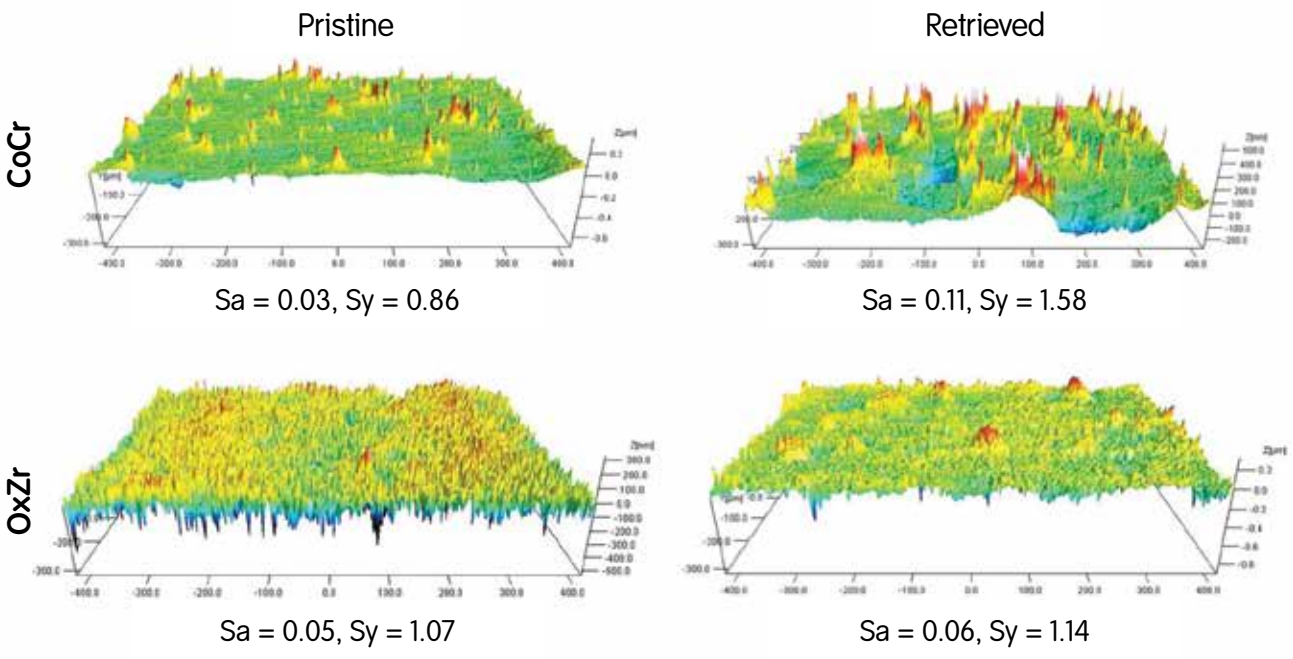


***Statistical Analysis**: General Estimating Equations (GEE) models were developed to estimate the differences in roughness between the materials.*

Results

- Scratching visible on CoCr retrievals, while little is seen on retrieved OxZr components
- The CoCr implants roughened significantly more in vivo than the OxZr components
- The average surface roughness for the retrieved CoCr was 83% greater than the OxZr retrieved components

3D surface profiles of Oxidized Zirconium and Cobalt-Chromium femoral components



* Median values reported for roughness parameters. All values in µm.

Conclusions

- Increased surface roughness with CoCr could impact the *in vivo* adhesive and abrasive PE wear mechanisms
- Understanding the surface roughness of the bearing material can help explain the damage seen *in vivo*
- A smoother surface, such as OxZr, with superior wear properties is an ideal bearing surface for a TKA

References
1 White SE. CORR. 1994.
2 Heyse, T. Knee. 2011.
3 Good, V. JBJS. 2003.

Acknowledgements
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