**BIOLOX® Ceramic-on-Ceramic**

- CoC bearings show excellent mid- and long-term clinical results*
- CoC bearings have the lowest wear characteristics of all articulations*
- Osteolysis is extremely rare in CoC bearings*
- Safe in terms of metal ion release*
- Fretting/corrosion at the modular taper interface is mitigated*
- No known risk of allergy for CoC bearings*
- A pathogenic reaction to ceramic particles is very unlikely*
- Ceramics may impart a lower incidence of PJI*
- Excellent short and mid term clinical and functional outcomes with CoC large bearings*
- Over 3 millions implanted CoC bearing couples worldwide (assumption for CoC worldwide)*
- Ceramic bearings are safe, effective, and highly successful solution for revision THA*

*References available on file at CeramTec GmbH on request.

**Reference** | **Survivorship [%]** | **Follow-up in years**
---|---|---
Toni et al. Hip Int. 2017 | 93% | 17,40
Kang et al JJoA 2015 | 98,90% | 15,00
Steppacher et al SemArthrop 2011 | 97,20% | 14,00
Kusaba et al DKOU 2013 | 98,20% | 14,00
Lee et al Sem Arthrop 2013 | 96,20% | 13,00
Kim et al Int Orthop 2013 | 99% | 12,40
Imbuldeniya et al ISTA 2013 | 96,50% | 11,50
Lee at al JBJS 2010 | 99% | 10,00
Kusaba et al SemArthrop 2011 | 97,60% | 10,00
Hsu et al SemArthrop 2011 | 96,30% | 10,00
D’Antonio et al CORR 2012 (System 1) | 100% | 10,00
D’Antonio et al CORR 2012 (System 2) | 98,60% | 10,00
Yoon et al CORR 2012 | 98,90% | 10,00
Chana et al BJJ 2013 | 96,50% | 10,00
D’Antonio et al CORR 2014 | 97% | 10,00
Epinet et Michael Jarthrop 2014 | 98,60% | 10,00
Yoo et al JoA 2013 | 96,90% | 9,80
Wang et al Arthop. Today 2016 | 97,30% | 9,40
Tozun et al Int Orthop 2014 | 97,80% | 8,20
Choy et al ClinOrthopSurg 2013 | 98,10% | 7,80
Kim et al. JoA 2017 | 99,70% | 7,80
Kim et al Int Orthop 2014 | 100% | 7,40
Kang et al JoA 2014 | 97,90% | 6,50
Aoude et al JoA 2015-online | 98,50% | 6,00

**Osteolysis is extremely rare in CoC bearings**

- Most recent studies report NO osteolysis in the mid to long term when CoC bearings are used
  - Choy et al 2013
  - Kang et al 2014
  - Imbuldeniya et al 2013
  - Murphy et al 2013
  - Tozun et al 2014
  - Lee et al 2013

- CoC bearings in revision surgeries can reduce or even halt the progression of osteolytic lesions
  - Jack et al 2013
  - Kim et al SICOT 2011
  - Park et al AAOS 2011
  - Yoo et al JoA 2013

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References:

- Aoude et al JoA 2015-online
- Kang et al JoA 2014
- Kim et al Int Orthop 2014
- Kim et al. JoA 2017
- Tozun et al Int Orthop 2014
- Kang et al JoA 2014
- Aoude et al JoA 2015-online

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*References available on file at CeramTec GmbH on request.

**Survivorship [%]**

<table>
<thead>
<tr>
<th>Year</th>
<th>CoC</th>
<th>CoP</th>
<th>MoP</th>
<th>MoM</th>
</tr>
</thead>
<tbody>
<tr>
<td>100%</td>
<td>8%</td>
<td>61%</td>
<td>31%</td>
<td>&lt;1%</td>
</tr>
<tr>
<td>95%</td>
<td>43%</td>
<td>22.4%</td>
<td>35.2%</td>
<td>1.2%</td>
</tr>
<tr>
<td>90%</td>
<td>32%</td>
<td>11.2%</td>
<td>54.8%</td>
<td>2%</td>
</tr>
<tr>
<td>85%</td>
<td>16.5%</td>
<td>22.4%</td>
<td>59.4%</td>
<td>0.7%</td>
</tr>
<tr>
<td>80%</td>
<td>62%</td>
<td>26%</td>
<td>11%</td>
<td>1%</td>
</tr>
<tr>
<td>75%</td>
<td>86%</td>
<td>13%</td>
<td>1%</td>
<td>0%</td>
</tr>
<tr>
<td>70%</td>
<td>25.6%</td>
<td>23%</td>
<td>44.6%</td>
<td>6.8%</td>
</tr>
</tbody>
</table>

**Prevalence of bearings**

- Germany
- France (private hospitals)
- France (public hospitals)
- UK
- Italy (Region Emilia-Romagna)
- Korea
- Australia

**Estimation**
Ceramic bearings are a safe, effective, and highly successful solution for revision THA

<table>
<thead>
<tr>
<th>Study</th>
<th>Number of hips</th>
<th>Index Revisions due to Aseptic Loosening (%)</th>
<th>Mean followup in years (range)</th>
<th>Bearing used for Revision</th>
<th>Fractures (%)</th>
<th>Kaplan Meier Survival (Re-revision)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hannouche et al.</td>
<td>110</td>
<td>83%</td>
<td>9.3 (5 to 27)</td>
<td>COC, 28% (31/110); C-P, 58% (64/110); M-P, 14% (15/110); BIOLOX® forte</td>
<td>–</td>
<td>83.1% “revision for mechanical failure” at 10 years</td>
</tr>
<tr>
<td>Chang et al.</td>
<td>42</td>
<td>64% (27/42)</td>
<td>5.4 (3.2 to 8)</td>
<td>COC, 100% (alumina)</td>
<td>–</td>
<td>100% (no re-revisions)</td>
</tr>
<tr>
<td>Yoo et al.</td>
<td>64</td>
<td>59% (38/64)</td>
<td>9.8 (7.0 to 13.1)</td>
<td>COC, 100% (alumina)</td>
<td>–</td>
<td>96.9% at 7 years</td>
</tr>
<tr>
<td>Jack et al.</td>
<td>165</td>
<td>98%</td>
<td>4.8 (2.1 to 12.5)</td>
<td>COC, 100% (alumina, 65 delta)</td>
<td>2 alumina heads</td>
<td>96.6% femur, 94% acetabulum at 8.3 years</td>
</tr>
<tr>
<td>Khadot et al.</td>
<td>629</td>
<td>14.3%</td>
<td>5</td>
<td>C-P (13.7%)</td>
<td>–</td>
<td>86.8% at 5 years</td>
</tr>
</tbody>
</table>

Table 1: Summary of clinical outcomes reported for ceramic bearings in Revision THA

References
1. BVMed 2015
2. Official data as reported in HAS Report 2014
3. HAS Report 2014
4. National Joint Registry 2015
6. HRA Korea 2015
7. JORRA Korea 2015