Advanced multifunctional zirconia ceramics for long-lasting implants

From 2012-01-01 to 2015-06-30, closed project

Project details

<table>
<thead>
<tr>
<th>Total cost:</th>
<th>Topic(s):</th>
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<tr>
<td>EUR 5 557 540,40</td>
<td>NMP.2011.2.1-1 - Research and innovation for advanced multifunctional</td>
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<tr>
<td></td>
<td>ceramic materials</td>
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<tr>
<td>EU contribution:</td>
<td>Funding scheme:</td>
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<tr>
<td>EUR 4 000 000</td>
<td>CP-TP - Collaborative Project targeted to a special group (such as SMEs)</td>
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<td>Coordinated in:</td>
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<td>France</td>
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Objective

The aim of LONGLIFE is to develop new multi-functional zirconia oral and spine (lumbar inter-vertebral disc) implants, with a perfect reliability and a lifetime longer than 60 years. Such an ambitious goal, motivated by the risks and costs associated to revision surgery, will only be reachable by an improvement of the Low Temperature Degradation (LTD) resistance of zirconia and by an enhancement of the osseointegration capabilities of the implants in contact with bone. As zirconia-based ceramics are the only oxides able to couple high stress resistance and fracture toughness thanks to transformation toughening, a strong effort will be given to the improvement of their stability in the presence of water, without decreasing their toughness and strength. Osseointegration will be improved by the chemical and topographical modification of the surface. We aim at producing zirconia surfaces able to decrease the risk of bacterial adhesion and improve bone apposition, for better clinical success. Given the specific nature of ceramics, especially versus the risk of brittle failure, we aim at developing new ceramic-oriented designs for the implants, and not just ‘copy and paste’ from metal implants as it is generally done at present. This ‘implants by design’ approach will ensure a better, long-lasting success of oral and spine implants. At last, the LONGLIFE consortium will develop acceleration tests which will be able to reproduce more effectively the different degradation mechanisms and their interplay in a multi-physics approach, in order to ensure an implant reliability and lifetime superior to current implants.

Related information

Report Summaries

Final Report Summary - LONGLIFE (Advanced multifunctional zirconia ceramics for long-lasting implants)
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