

# Hip Implants With Evidence of Phased Introduction Have Improved Survivorship at Long Term Follow-up

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**INTRODUCTION:** Loosening of the acetabular component is a common reason for revision following a Total Hip Replacement (THR). Radiostereometric analysis (RSA) has been used to predict long-term loosening due to acetabular component loosening at two years follow-up (1). RSA is currently the most sensitive method to measure acetabular cup migration in vivo (2). RSA has been previously suggested to be used as an early qualitative tool necessary for the early phased introduction of new orthopaedic hip implants internationally but not all hip implants have been studied with RSA. Despite this, it is not clear if the use of RSA in the phased introduction of acetabular components has an influence on their long-term performance. Long term survival data is best collected from national registries, rather than small cohort studies that can be limited by patient dropout. Therefore, the aim of this study was to determine whether there was a difference in all-cause revision rate between non-RSA-tested and RSA-tested acetabular cup listed in national hip arthroplasty registries at both 5- and 10-years follow-up.

**METHODS:** Survival data was collected from national orthopaedic registries that reported 10-year survivorship rates of individual acetabular cup designs. Registries were not included in the study if they did not report 10-year survivorship data of acetabular cup designs. From twenty-six national registries, seven national hip registries were included in the study. The 5- and 10-year revision rates with their corresponding 95 confidence intervals or standard errors were extracted per design. A recent meta-analysis was used to identify RSA-tested acetabular cup designs and was matched by femoral stem and cup combination (3). A random-effects model was used to calculate the pooled revision rate at 5- and 10-years follow-up for non-RSA tested and RSA-tested acetabular cups. The mean difference in revision rates at 5- and 10-years follow-up was calculated by pooling the data and using RSA as a factor in the random-effects model.

**RESULTS SECTION:** Mean all-cause revision rates at 5 years for non-RSA-tested and RSA-tested cups were 3.6% (95% CI 3.4 to 3.8) and 2.7% (95% CI 2.4 to 2.9), with a mean difference of 0.9% favoring RSA-tested implants (95% CI 0.4 to 1.3;  $p < 0.001$ ). Mean all-cause revision rates at 10-years for non-RSA-tested and RSA-tested acetabular cups were 6.5% (95% CI 6.3 to 6.9) and 5.0% (95% CI 4.5 to 5.5), with a mean difference of 1.5% in favor of RSA-tested acetabular cups (95% CI 0.7 to 2.2;  $p < 0.001$ ). This evidence further supports the use of RSA as a surveillance tool to monitor new acetabular cup introduced in the orthopaedic market.

**DISCUSSION:** RSA-tested acetabular cups have a significantly lower revision rates at both 5- and 10-years follow-up than non-RSA tested acetabular cups. An improvement in revision rate of approximately 1.5% at 10 years can result in a decrease of approximately 30% in revision burden during this period. Revision rate due to aseptic loosening could not be investigated as the national registries did not report the data.

**SIGNIFICANCE/CLINICAL RELEVANCE:** Considering the decrease of approximately 30% for all-cause revision rate at 10-years, this could have significant impact on the burden of patients requiring THR revision and result in significant reduction in health-related costs.

## REFERENCES:

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**ACKNOWLEDGEMENTS:** Stuart Callary was supported by a Research Fellowship from The Hospital Research Foundation Group during this study.

**Table 1:** The mean 10-years all-cause revision rates of RSA-tested and non-RSA acetabular cups from international registries

Acetabular Cups	National Registries 10-years pooled revision rate (95% CI)							
	Australia	Netherlands	Denmark	Finland	United Kingdom	Emiliano Romagna	New Zealand	Combined Registries
<b>RSA-TESTED</b>	5.7 (5.0-6.3)	4.5 (3.2-5.8)	2.0 (1.1-2.8)	8.5 (6.7-10.4)	3.6 (2.6 -4.5)	4.9 (4.2 -5.5)	6.4 (4.6 - 8.1)	5.0 (4.5- 5.5)
<b>Non-RSA TESTED</b>	5.0 (4.5-5.4)	4.0 (3.6-4.5)	1.8 (1.3-2.2)	11.7 (10.5 to 12.9)	5.2 (4.6 -5.9)	5.1(4.4-5.9)	6.3 (5.8-6.8)	6.5 (6.3- 6.9)