

# Risk Factors For Wear Of First Generation Modular Cups

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## Objective of the investigation

Identify the risk factors for increased polyethylene wear  
Compare the performance of this prosthesis with published data

## Methods

The cementless ABG 1 system consists of an anatomic femoral component intended for proximal metaphyseal fixation and a hemispherical exact-fit cup. Both components were manufactured from Ti-6Al-4V and coated with a ca. 50  $\mu\text{m}$  thick vacuum plasma-sprayed HAC-coating onto a rough CP-Ti surface ( $R_z=30.15 \mu\text{m}$ ); only proximally on the stem. The polyethylene of this first generation modular cup was radiation-sterilised in air. The articulation was mostly 28 mm in diameter with a majority of heads being Zirconia.

Review of the results of

- a multicentric national;
- a prospective international;
- a single center study with a total of 1'090 cases (5-10 years follow-up).

Determination of the survival rate, osteolysis, wear (Martell method) etc. and correlation with patient and radiographic parameters

Analysis of retrievals for wear, wear vectors, damage and degradation of the insert

Review of 88 articles from peer-reviewed journals; comparison with above results

## Results

Survival rate at a follow-up of 5 to 10 years was high, with 95.6%; 99.2% and 97.7% respectively for the cup in the 1'090 cases under review. The incidence of radiographic osteolysis was up to 18.7% at 10 years

Reasons for wear and osteolysis are multifactorial. Risk factors (apart from iatrogenic reasons) for first generation modular cups are:

- Thin PE liners / large heads
- Young / active patients
- Female patients
- PE radiation-sterilised in air
- Time in situ
- Rim loading of the insert
- Cup inclination

In general published data is comparable with those obtained for the ABG 1 cup, but female gender and inclination were identified as additional risk factors  
HAC-coated ABG 1 cups revealed wear rates identical to porous (PC) cups, measured using an identical method; the scatter was less for the HAC-coated ABG 1 system (Fig. 1)

Polyethylene wear rate was comparable to the relevant literature (Fig. 2)

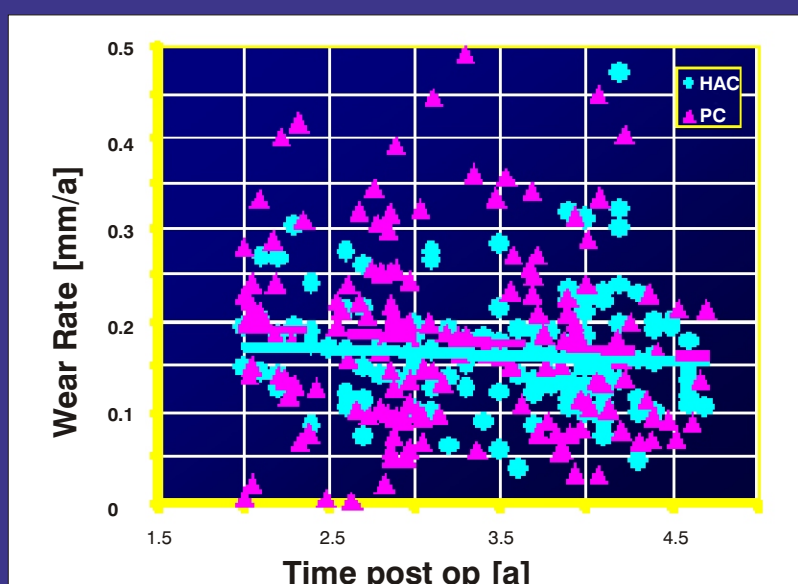


Fig. 1: PC and HAC-coated cups for 150 patients each

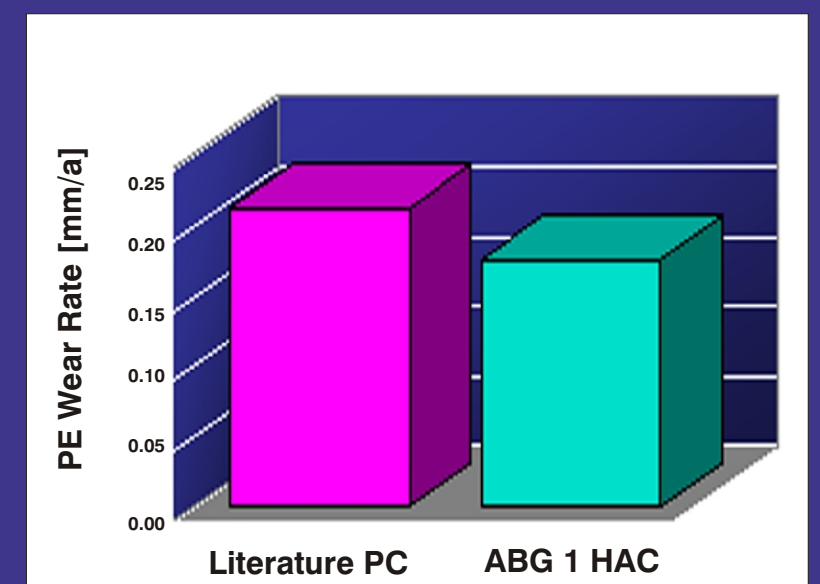


Fig. 2: Wear data after 6 years

Retrieval analysis showed in some incidences degradation of the PE inserts radiation-sterilised in air. The wear rate was generally higher, with multiple wear vectors compared to the data obtained radiographically. Creep into screw holes was common but backside wear was almost non-existent

## Conclusion

Osteointegration of the cementless ABG 1 total hip system was excellent and the survival rates above 95% at any time interval up to 10 years

These results compare favourable with other first generation total hip joint replacements

Thin, homogeneous HAC-coating of the second generation is safe

The rate of osteolysis with 18.7% at 10 years is high but in the range of first generation modular cups

Reasons for wear and osteolysis are multifactorial

Several risk factors have been identified and addressed with a 2nd generation modular cup (ABG II), with improved congruency and locking mechanism, polished internal shell surface, thick and in inert gas sterilised and stabilised PE (Duration®) and a ceramic/ceramic option (Fig. 3)



Fig. 3: ABG II cup with alumina/alumina articulation