

# Less wear with 28 med mer alumina heads on conventional polyethylene - A 10 year RSA study -

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## Aim of study:

## Compare wear patterns of cobalt-chrome and aluminum-oxide heads on conventional polyethylene in total hip arthroplasties

### Background

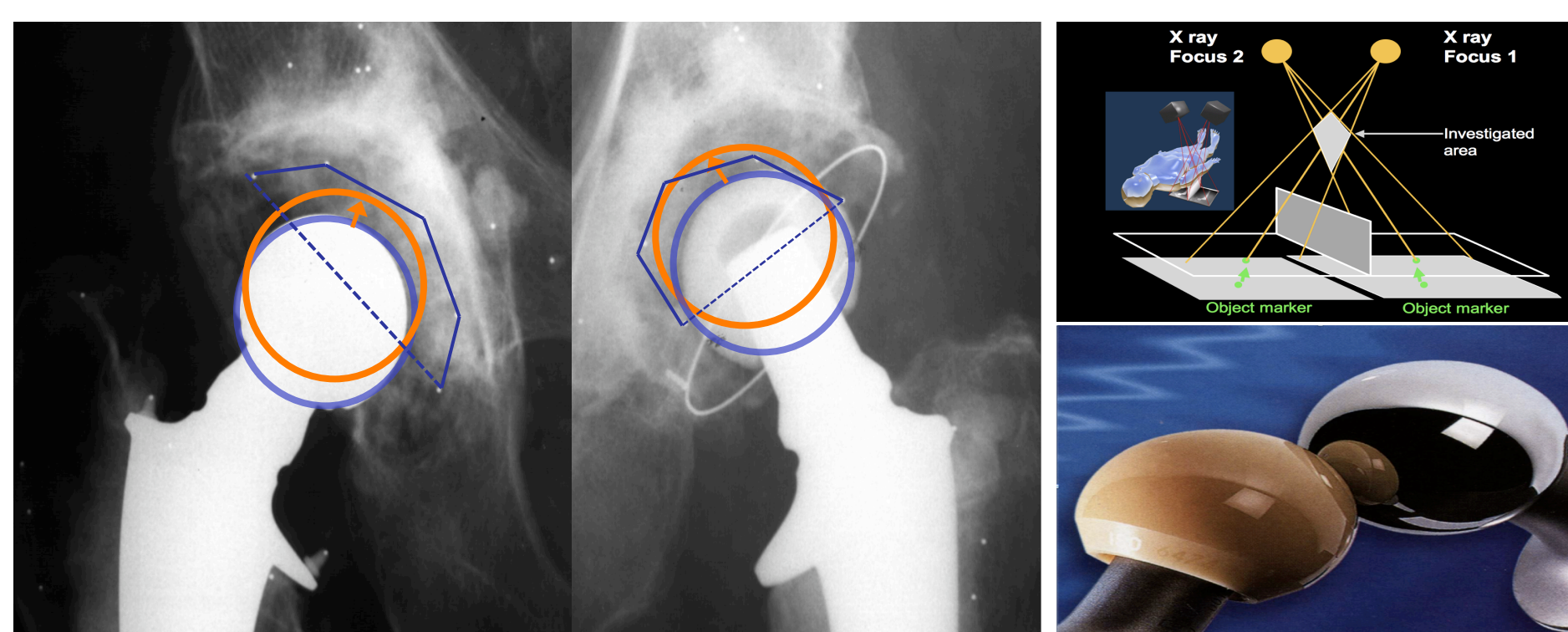
Polyethylene wear is the main culprit for aseptic loosening in total hip arthroplasty (THA). A trend towards bigger femoral heads increases wear in hard on soft bearings. Ceramics are thought to wear less than metal on polyethylene. This is shown in laboratory tests with hip simulators, but not yet in long term clinical trials.

### Material

47 hips were operated with 28 mm alumina heads and 40 hips 28 mm cobalt-chrome heads in the same period by the same surgeons in two randomized trials. Both materials articulated against a cemented all-polyethylene cup. The polyethylenes were sterilized in inert atmosphere and gamma irradiated with 3 Mrad. The groups were similar age (mean 67 years, range 51-81) and gender wise (♂:♀ / 1:3).

### Methods

All patients were assessed with radiostereometry (RSA) postoperatively, 3, 6, 12, 24, 60 and 120 months. Wear was measured as positive translation of the femoral head in relation to the tantalum marked cup. This was done both for linear and 3-D wear. The precision for proximal wear was 0,25 mm which was assessed by 184 double examinations.



Cobalt-Chrome head

Alumina head

1. Marking of cup and calculation of head centre

2. Calculating movement of head centre compared to the cup as a finite body

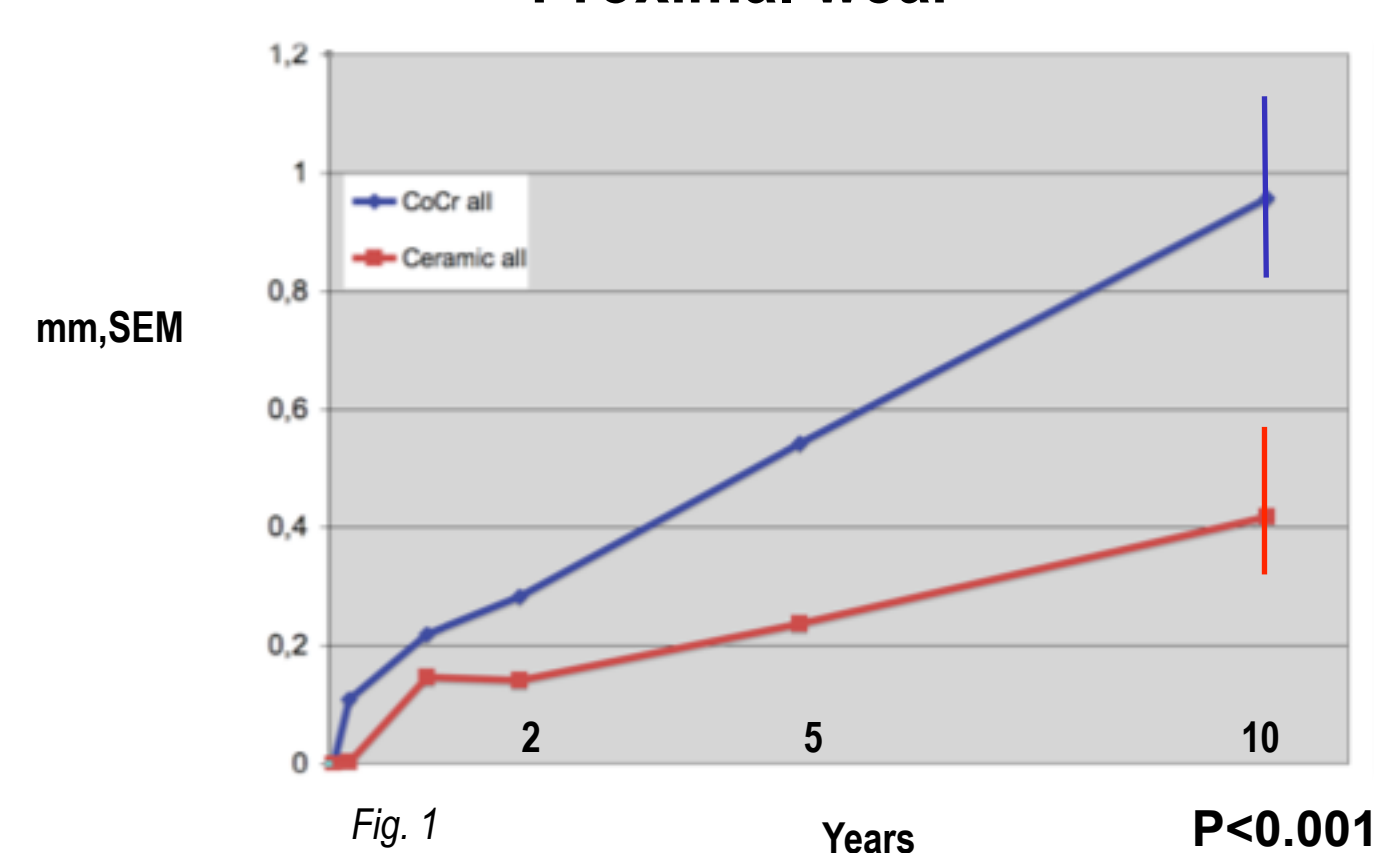
Top: Setup for RSA measurements

Bottom: Alumina and Cobalt-Chrome heads

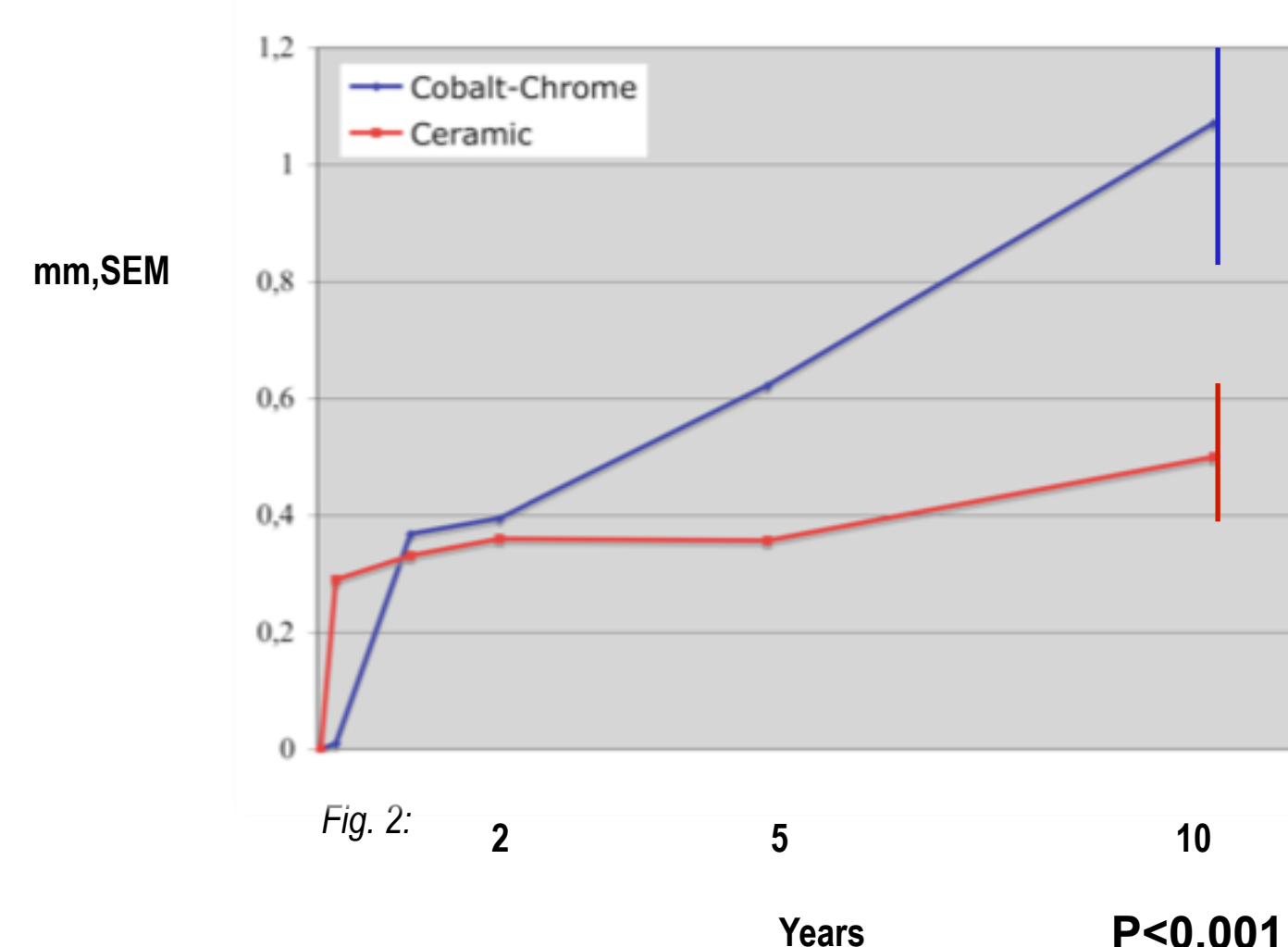
### Results

After 10 years there was significantly less proximal and 3-D wear with alumina heads: 0.43 (0.25-0.62) mm in the  $Al_2O_3$  group and 0.78 (0.31-1.25) mm in the CoCr group. 3D penetration was 0.53 (0.33-0.72) and 0.96 (0.43-1.47) mm in the  $Al_2O_3$  and CoCr group, respectively. As shown in fig 1 and 2.

#### Proximal wear



#### 3D wear



### Discussion

This study is a synthesis of two randomized trials and thus not a randomized trial. There are some confounders: 50 % of the patients in the CoCr group articulated against a Lubinus SP2 cup and 50% against a SHP cup. Both these polyethylenes though are gamma irradiated with 3 mrad and sterilized in inert atmosphere. The wear-pattern of these articulations are comparable to other CoCr on polyethylene

materials in the literature. In the alumina-group 50% of the patients were operated with Cemex bone cement and 50% with Palacos bone cement. There was no difference in wear between these groups. Future studies will show whether we can expect the same wear reduction with highly cross-linked polyethylene.

### Conclusion

Alumina heads reduced wear almost 50% compared to Cobalt-Chrome heads of the same size.

Further investigations are needed to see if this reduction also leads to less osteolysis and lower revision-rates