

TABLE E-I Study Demographics

Implant	Patient Age at Primary Op. (yr)	Primary Implantation Date	Retrieval Date	Implant Survival (yr)	Cause of Revision
1	29	15-May-91	10-Jun-98	7.1	Osteolysis
19	19	21-May-90	24-Jun-98	8.1	Osteolysis
23	38	17-Nov-88	19-Jun-98	9.6	Aseptic loosening
24	67	10-Feb-88	9-Apr-98	10.2	Osteolysis
115	68	2-Oct-87	27-Jul-94	6.8	Osteolysis
201	48	23-Aug-89	18-Feb-97	7.5	Osteolysis
206	33	22-Dec-89	1-Dec-98	8.9	Aseptic loosening
207	72	1-Sep-89	19-Jan-99	9.4	Osteolysis
237	60	12-Oct-88	25-Mar-99	10.5	Aseptic loosening
257	66	18-Sep-89	11-May-99	9.6	Osteolysis
258	66	25-Jul-88	13-May-99	10.8	Aseptic loosening
259	61	4-Dec-91	18-May-99	7.5	Osteolysis
328	56	27-Apr-88	14-Oct-99	11.5	Osteolysis
338	68	1-Dec-87	9-Nov-99	11.9	Osteolysis
350	50	23-Dec-89	30-Nov-99	9.9	Osteolysis
359	54	30-May-90	9-Feb-00	9.7	Osteolysis
371	77	14-Jan-90	12-Jan-00	9.9	Aseptic loosening
Avg. and stand. dev.	54.8 $\pm$ 16.5			9.3 $\pm$ 1.5	

TABLE E-II Two-Dimensional Wear Penetration Rates

Implant	PolyWare		Hip Analysis Suite		CMM Two-Dimensional Wear Rate† (mm/yr)
	Two-Dimensional Wear Rate* (mm/yr)	Difference from CMM Two-Dimensional Wear Rate† (mm [%])	Two-Dimensional Wear Rate* (mm/yr)	Difference from CMM Two-Dimensional Wear Rate† (mm [%])	
1	0.377 ± 0.027	0.086 (29.6)	0.478 ± 0.001	0.188 (64.5)	0.291
19	0.133 ± 0.024	0.067 (33.6)	0.217 ± 0.010	0.018 (8.8)	0.200
23	0.160 ± 0.021	0.056 (26.0)	0.208 ± 0.000	0.008 (3.6)	0.216
24	0.124 ± 0.036	0.006 (5.0)	0.136 ± 0.000	0.017 (14.6)	0.118
115	0.128 ± 0.058	0.140 (52.2)	0.348 ± 0.045	0.081 (30.1)	0.268
201	0.450 ± 0.020	0.092 (16.9)	0.469 ± 0.011	0.072 (13.3)	0.541
206	0.336 ± 0.000	0.097 (22.4)	0.428 ± 0.015	0.005 (1.1)	0.433
207	0.144 ± 0.010	0.001 (0.4)	0.134 ± 0.000	0.012 (6.4)	0.144
237	0.334 ± 0.015	0.014 (4.2)	0.382 ± 0.015	0.062 (19.2)	0.321
257	0.141 ± 0.00	0.085 (37.5)	0.262 ± 0.021	0.036 (16.1)	0.226
258	0.249 ± 0.011	0.024 (8.6)	0.261 ± 0.021	0.012 (4.4)	0.273
259	0.073 ± 0.036	0.036 (32.7)	0.041 ± 0.000	0.067 (61.9)	0.108
328	0.208 ± 0.031	0.006 (3.0)	0.191 ± 0.012	0.024 (11.0)	0.215
338	0.213 ± 0.024	0.051 (19.2)	0.249 ± 0.030	0.015 (5.72)	0.264
350	0.227 ± 0.013	0.078 (25.5)	0.302 ± 0.008	0.003 (0.9)	0.305
359	0.396 ± 0.047	0.042 (12.0)	0.418 ± 0.002	0.064 (18.2)	0.354
371	0.078 ± 0.009	0.009 (10.3)	0.055 ± 0.000	0.032 (37.2)	0.087
Avg. and stand. dev.	0.222 ± 0.117	0.052 ± 0.040 (19.9 ± 14.4)	0.269 ± 0.137	0.042 ± 0.046 (18.6 ± 19.4)	0.257 ± 0.117

*Individual average and standard deviations are based on five repeated analyses per patient. The final row represents the average and standard deviation for the entire population in each column (that is, the average and standard deviations of the averages for each patient). †CMM = coordinate measuring machine. Each value represents the absolute difference (either underestimation or overestimation) followed by absolute percent difference in parentheses. The final row represents the average and standard deviation for the entire population in each column.

TABLE E-III Three-Dimensional Wear Penetration Rates

Implant	PolyWare		Hip Analysis Suite		CMM Three-Dimensional Wear Rate† (mm/yr)
	Three-Dimensional Wear Rate* (mm/yr)	Difference from CMM Three-Dimensional Wear Rate† (mm [%])	Three-Dimensional Wear Rate* (mm/yr)	Difference from CMM Three-Dimensional Wear Rate† (mm [%])	
1	0.433 ± 0.026	0.142 (48.8)	0.481 ± 0.001	0.191 (65.7)	0.291
19	0.210 ± 0.025	0.010 (4.9)	0.220 ± 0.010	0.020 (10.1)	0.200
23	0.207 ± 0.024	0.009 (4.3)	0.233 ± 0.002	0.017 (7.66)	0.216
24	0.183 ± 0.025	0.065 (55.0)	0.136 ± 0.001	0.018 (14.9)	0.118
115	0.246 ± 0.027	0.022 (8.3)	0.352 ± 0.043	0.084 (31.2)	0.268
201	0.459 ± 0.020	0.082 (15.2)	0.522 ± 0.010	0.019 (3.6)	0.541
206	0.345 ± 0.000	0.082 (20.2)	0.429 ± 0.015	0.004 (1.0)	0.433
207	0.200 ± 0.023	0.056 (39.3)	0.136 ± 0.002	0.007 (5.0)	0.144
237	0.345 ± 0.000	0.025 (7.7)	0.383 ± 0.022	0.062 (19.5)	0.321
257	0.163 ± 0.016	0.063 (27.9)	0.293 ± 0.040	0.067 (29.9)	0.226
258	0.293 ± 0.003	0.020 (7.3)	0.261 ± 0.019	0.012 (4.4)	0.273
259	0.088 ± 0.042	0.020 (18.5)	0.045 ± 0.000	0.064 (58.7)	0.108
328	0.242 ± 0.010	0.013 (6.1)	0.205 ± 0.012	0.017 (6.3)	0.215
338	0.251 ± 0.040	0.013 (4.8)	0.281 ± 0.027	0.010 (4.8)	0.264
350	0.242 ± 0.010	0.062 (20.5)	0.324 ± 0.008	0.019 (6.4)	0.305
359	0.417 ± 0.028	0.063 (17.9)	0.420 ± 0.002	0.067 (18.9)	0.354
371	0.084 ± 0.010	0.003 (4.0)	0.067 ± 0.000	0.020 (22.7)	0.087
Avg. and stand. dev.	0.260 ± 0.111	0.049 ± 0.037 (18.3 ± 16.0)	0.282 ± 0.14	0.041 ± 0.046 (18.3 ± 19.0)	0.257 ± 0.117

*Individual average and standard deviations are based on five repeated analyses per patient. The final row represents the average and standard deviation for the entire population in each column (that is, the average and standard deviations of the averages for each patient). †CMM = coordinate measuring machine. Each value represents the absolute difference (either underestimation or overestimation) followed by absolute percent difference in parentheses. The final row represents the average and standard deviation for the entire population in each column.

TABLE E-IV Volumetric Wear Penetration Rates

Implant	PolyWare		Hip Analysis Suite		CMM Volumetric Wear Rate† (mm^3/yr)
	Volumetric Wear Rate* (mm^3/yr)	Difference from CMM Volumetric Wear Rate† (mm^3 [%])	Volumetric Wear Rate* (mm^3/yr)	Difference from CMM Volumetric Wear Rate† (mm^3 [%])	
1	175.2 ± 13.4	2.8 (1.6)	212.4 ± 0.9	34.5 (19.54)	177.9
19	119.0 ± 15.3	11.3 (10.5)	131.6 ± 6.6	23.9 (22.2)	107.7
23	53.1 ± 11.0	19.8 (27.1)	57.7 ± 0.9	15.2 (20.9)	72.9
24	46.1 ± 13.9	0.48 (1.05)	55.5 ± 1.1	9.8 (21.5)	45.7
115	124.5 ± 16.9	1.6 (1.3)	183.2 ± 26.6	57.1 (45.3)	126.1
201	225.4 ± 13.5	14.4 (6.0)	299.6 ± 7.0	59.9 (25.0)	239.7
206	197.6 ± 0.2	22.5 (10.2)	256.7 ± 10.5	36.6 (16.6)	220.1
207	73.0 ± 17.1	9.8 (11.9)	57.3 ± 1.9	25.5 (30.8)	82.8
237	122.7 ± 17.7	12.7 (9.4)	114.4 ± 12.5	21.0 (15.5)	135.4
257	75.0 ± 5.1	39.8 (34.7)	148.1 ± 14.5	33.4 (29.1)	114.8
258	132.7 ± 3.5	30.5 (18.7)	135.3 ± 10.3	28.0 (17.1)	163.3
259	48.8 ± 26.5	9.8 (25.0)	13.9 ± 0.3	25.2 (64.5)	39.0
328	76.3 ± 15.7	14.9 (16.3)	63.4 ± 12.0	27.7 (30.4)	91.2
338	132.2 ± 32.4	3.9 (2.8)	147.7 ± 14.6	11.7 (8.6)	136.1
350	123.0 ± 5.8	28.2 (18.7)	188.3 ± 6.6	37.1 (24.5)	151.2
359	188.5 ± 25.9	32.2 (20.6)	174.4 ± 6.0	18.2 (11.6)	156.3
371	47.4 ± 5.9	2.6 (5.8)	37.9 ± 0.2	6.9 (15.3)	44.8
Avg. and stand. dev.	115.3 ± 56.61	15.1 ± 12.0 (13.0 ± 10.00)	134.0 ± 80.0	27.7 ± 14.7 (24.6 ± 13.4)	123.8 ± 58.4

*Individual average and standard deviations are based on five repeated analyses per patient. The final row represents the average and standard deviation for the entire population in each column (that is, the average and standard deviations of the averages for each patient). †CMM = coordinate measuring machine. Each value represents the absolute difference (either underestimation or overestimation) followed by absolute percent difference in parentheses. The final row represents the average and standard deviation for the entire population in each column.

TABLE E-V Summary of Standard Variance Component Analysis

	Two-Dimensional Wear Rate		Three-Dimensional Wear Rate		Volumetric Wear Rate	
	PolyWare	Hip Analysis Suite	PolyWare	Hip Analysis Suite	PolyWare	Hip Analysis Suite
Precision of measurement tool (2 stand. dev.)	0.414 mm	0.242 mm	0.384 mm	0.262 mm	286.44 mm ³	153.24 mm ³
% contribution of technique to variance	4.36%	1.31%	4.33%	1.47%	7.82%	1.51%