APPENDIX 5: MOBILE VERSUS FIXED BEARING TOTAL KNEE REPLACEMENT SURVIVAL - A META ANALYSIS

Overview

This section provides a meta analysis of knee implant survival, and is based on published estimates which have appeared in the recent peer reviewed literature. Estimates of implant survival were extracted from a total of 37 articles published between the years 1989 and 2002, and types of implants were grouped into mutually exclusive categories (i.e., mobile bearing or fixed bearing) prior to summarization.

There were 21 articles which summarized survival for devices which were grouped into a mobile bearing category and 16 grouped into a fixed bearing category. From these a total of 111 survival estimates were extracted, with 40 mobile bearing device group estimates, and 71 fixed bearing device group estimates. For each implant, information on the average period of follow-up and the total number of knee implants was tabulated. A bibliography of the articles used for this meta analysis is included in this appendix.

Since the number of survival estimates appearing in a given publication ranged from 1 to 30, data was reduced allowing only one estimate for each unique device (or set of similar devices within the mobile or fixed bearing group) from each article. When multiple survival estimates were provided for a unique device, data was reduced retaining the estimate with the most consistent definition of revision and the longest length of follow-up. The list of implant devices within each device group, the definition of revision leading to inclusion, and definition(s) of revision leading to exclusion are included (see table 22 in Appendix 5).

Meta Analysis

Weighted least squares (WLS) was used to generate overall and device-specific estimates of implant survival. The general form of the model is:

$$Y_{unique\ device\ within\ study, devicegroup} = m_{overall} + g_{devicegroup} + e_{unique\ device\ within\ study, devicegroup}$$

where device group corresponded to either the mobile or fixed bearing group.

A bootstrap resampling procedure was used to estimate the confidence limits for estimates in the meta analysis of implant survival using a paired resampling procedure. Within each device group an estimate and the corresponding log-transformed number of knee-years (pair) were chosen at random and with replacement. This procedure was repeated until 26 observations were sampled from the mobile bearing group and 30 from the fixed bearing group, the group sizes in the analysis data set, and WLS estimation was performed on this “bootstrapped” data set. This bootstrap procedure was repeated 1,000 times. Two-sided ninety-five percent confidence intervals for survival estimates were generated for WLS estimates, and a two-sided P-value was determined for the estimated difference between mobile and fixed bearing devices. These were empirically determined from the relevant distribution of parameter estimates.

Results

Follow-up extends up to an average 17.2 years (the maximum mean length of follow-up appearing in all of the articles considered). This varied between device groups with mobile bearing having a relatively shorter length of follow-up (maximum follow-up 12.5 years) than fixed bearing (maximum follow-up 17.2 years). Also, there were fewer devices under follow-up within the mobile bearing knee group than were under follow-up in the fixed bearing group (a maximum of 665 implants followed-up for mobile bearing and 4,583 for fixed bearing). Such differences in follow-up and study size are offset through the use of a regression-based estimation procedure where imbalances between groups are accounted for in analysis.

Figure G in Appendix 5 extracted versus “knee-years” of follow-up. Survival estimates corresponding to implant device groups were given different symbols to allow for the identification of specificity. Estimates which were dropped prior to analysis appear in Figure G with different symbols than those retained allowing for additional scrutiny.

Figure H in Appendix 5 presents a plot of all survival estimates versus various representations of study attributes allowing for visual inspection of survival estimate homogeneity for each device group across the distribution of potential weighting variables.

Homogeneity of survival estimates was separately examined for each device group to identify the appropriate weight variable from the analysis data set (reduced data set). The distribution of the weighting variable was split into fourths (i.e., quartiles) for each device group, and (3) indicator variables were constructed to represent the quartiles in an assessment of within-group homogeneity. Weighted mean of the survival estimates for each quartile were separately compared to assess equality across the quartiles for each device group. Descriptive statistics for study attributes are presented in table 18 below:

Table 18 - Descriptive statistics for study attributes

Data Set	**Grp**	**Variable**	**N**	**Mean**	**Median**	**Std Dev**	**Min**	**Max**
Full	MB	N Implants	40	254.55	273	179.36	15	665
		Years of FU		7.00	5.6	2.88	2.5	12.5
		Knee-Years		1953	1310.5	1549	45	3864
	FB	N Implants*	71	997.13	234	2046.66	49	9200
		Years of FU		7.75	8.0	4.09	2.0	17.2
		Knee-Years*		6528	1478	15347	214	92000
Reduced	MB	N Implants	26	230.81	133.5	194.50	15	665
		Years of FU		6.28	5.4	2.81	2.5	12.5
		Knee-Years		1542	1005	1403	45	3864
	FB	N Implants	30	663.9	1168.90	229	49	4583
		Years of FU		8.36	8.0	3.53	17.2	3.5
		Knee-Years		6033	1615	13578	224	68745

*Note – Includes estimates corresponding to a combination of all implant designs from Rand et al. 1991. Estimates for the combination were not considered in analysis, rather estimates corresponding to specific implant designs were analyzed.

Homogeneity was tested using an F-statistic, comparing the residual error from a “full” model which included quartile indicators with the residual error from a “reduced” model which consisting only of an intercept. This test was performed to assess whether the weighted mean survival estimates markedly differed between the quartiles (e.g., heterogeneity). The following results were obtained (see table 19):

Table 19 – Homogeneity Analysis

Weight	MBK P-value	FB P-value
Ln (Knee-Years Follow-up)	0.9667	0.7959
Ln (Mean Years of Follow-up)	0.4247	0.9831
Ln (N Knees)	0.9434	0.0540
Knee-Years Follow-up	0.4877	0.9831
Mean Years of Follow-up	0.4877	0.9831
N Knees	0.8968	0.0142

The P-values presented above are similar for the different weighting variables. However, in the separate examination of the residuals from the weighted analyses by device group (via Shapiro-Wilk normal statistics), the null hypothesis of normality was not rejected for residuals within both device groups where log knee-years was the weight. This led to the decision to use knee-years as the weighting variable in the analyses. Knee-years were calculated as the product of the number of cases (e.g., knees) summarized in the survival estimate and the corresponding mean years of subject follow-up. For studies which did not report mean years of subject follow-up, a convention was applied using one-half the total length of follow-up as the estimate of average follow-up. Figure I in Appendix 5 presents survival estimates of the articles included in analysis by the corresponding estimate of knee-years of follow-up.

Weighted least squares analysis was performed followed by bootstrap estimation of 95 percent confidence intervals for estimates and significance determination. The following results were obtained (see table 20):

Table 20 – Weighted Least Squares Analysis

	Overall Survival	**MBK Survival**	**FB Survival**	**Difference in Survival ¶ (FB-MBK)**
WLS Estimate	0.9198	0.9263	0.9133	-0.0130 ¶
95% CI*	(0.8985, 0.9401)	(0.8937, 0.9535)	(0.8830, 0.9410)	(-0.0550,0.03171) ¶
P-value**	NA	NA	NA	0.966

** Based on the 2.5th and 97.5th percentiles of the distribution of (2-stage) bootstrap estimates*
*** Based on the twice the minimum of the empirical probability of the two-stage bootstrap estimate being less than/equal to (or greater than/ equal to) the WLS estimate.*
¶ Computed as two times the estimate of the between-device group difference

The overall estimate of implant survival is approximately 92 percent. The mobile bearing device group has a greater estimated survival probability (approximately 93 percent) than the fixed bearing group (approximately 91 percent). However, this difference is not statistically significant (P-value 0.992).

Discussion

Estimates derived in meta analyses are generally weighted by attributes of the studies summarized. It is common to use weights which include the standard errors of estimates for each estimate included in analyses. Since these data were not commonly reported in the literature for implant survival, we considered other study attributes which reflect both study size and the length of follow-up. These attributes were both felt to influence estimates of survival. A strength of this measure is that it represents both the number of surgical implants (study size) in each study as well as duration of follow-up (mean).

Knee implants have a high probability of long-term survival. Based upon follow-up reports which were considered in generating summary estimates, the global estimate of implant survival extends up to an average 17.2 years of follow-up(the maximum mean length of follow-up appearing in the articles considered).

The greater likelihood of implant survival seen in the mobile bearing implant group may be due to the relatively shorter length of follow-up (maximum follow-up MBK=12.5 years, FB=17.2 years). Another factor which may have contributed to greater implant survival in the mobile bearing device group is that there were fewer devices under follow-up within the mobile bearing knee group than were under follow-up in the fixed bearing group (maximum number of implants followed-up for MBK=665 knees, for FB=4583 knees). Nevertheless, the information of implant survival within the mobile bearing group is credible as the mean length of follow-up currently extends to 12.7 years.

It is noted that there were 6 seemingly inferior implant designs having survival estimates of 80 percent or less. Three such survival estimates were in each design group, and are as follows (see table 21):

Table 21 – Survival Estimates

Article	**Implant Group**	**Brand Name (Type of Device)**	**N Implants**	**Years of Follow-up**	**Survival Estimate**
Duffy and Phillipson 2000	Mobile Bearing	Accord (MP PCL Sacrifice)	74	5.3	0.685
Harding et al. 2000	Mobile Bearing	Oxford Phase I (UM)	35	3	0.66
	Mobile Bearing	Oxford Phase II (UM)	15	3	0.80
Rand et al. 1991	Fixed Bearing	Guepar, Walldius, Tavernetti, Herbert, Sheehan, Sperocentric (Older Constrained)	356	10	0.76

Article	Implant Group	Brand Name (Type of Device)	N Implants	Years of Follow-up	Survival Estimate
Rand et al. 1991	Fixed Bearing	Geometric, Polycentric, UC Irvine (Older Resurfacing)	3159	10	77
	Fixed Bearing	Polycentric, Geometric, Porous-Coated Anatomic (Unicompartmental)	676	10	0.67

Although the estimates presented above may influence survival, they were retained in the analysis data set to avoid the potential for selection bias.

Conclusions

In conclusion, the evidence based on the meta analysis of implant survival estimates taken from peer reviewed publications does not indicate mobile bearing device implant survival differs from fixed bearing implant survival (two-sided P-value 0.966).

List of Peer Reviewed Articles Included in Meta Analysis Summary

Argenson, J.N., et al., Multicentre survival study of 552 unicompartmental arthroplasty using the Oxford Meniscal Knee (Abstract Only). J Bone Joint Surg Br, 1993. 75-B(Supp II): p. 130-1.

Buechel, F.F., Sr., et al., Twenty-year evaluation of meniscal bearing and rotating platform knee replacements. Clin Orthop, 2001. 388: p. 41-50.

Callaghan, J.J., et al., Cemented rotating-platform total knee replacement. A nine to twelve-year follow-up study. J Bone Joint Surg Am, 2000. 82(5): p. 705-11.

Carr, A., et al., Medial unicompartmental arthroplasty. A survival study of the Oxford meniscal knee. Clin Orthop, 1993(295): p. 205-13.

Carr, A., et al., Medial unicompartmental arthroplasty. A survival study of the Oxford meniscal knee. Clin Orthop, 1993(295): p. 205-13.

Colizza, W.A., J.N. Insall, and G.R. Scuderi, The posterior stabilized total knee prosthesis. Assessment of polyethylene damage and osteolysis after a ten-year-minimum follow-up. J Bone Joint Surg Am, 1995. 77(11): p. 1713-20.

Diduch, D.R., et al., Total knee replacement in young, active patients. Long-term follow-up and functional outcome. J Bone Joint Surg Am, 1997. 79(4): p. 575-82.

Duffy, P.J. and A.P. Phillipson, Long-term results of the Accord total knee replacement in the Countess of Chester Hospital. 2000. 7(3): p. 175-178.

Emmerson, K.P., C.G. Moran, and I.M. Pinder, Survivorship analysis of the Kinematic Stabilizer total knee replacement: a 10- to 14-year follow-up. J Bone Joint Surg Br, 1996. 78(3): p. 441-5.

Font-Rodriguez, D.E., G.R. Scuderi, and J.N. Insall, Survivorship of cemented total knee arthroplasty. Clin Orthop, 1997(345): p. 79-86.

Gill, G.S., A.B. Joshi, and D.M. Mills, Total condylar knee arthroplasty. 16- to 21-year results. Clin Orthop, 1999(367): p. 210-5.

Gunther, T.V., et al., Lateral unicompartmental arthroplasty with the Oxford Meniscal Knee. Knee, 1996. 3: p. 33-9.

Harding, M.L., A. Ullah, and S. Birtwhistle, Leicester experience of the Oxford Uni (Abstract Only). J Bone Joint Surg Br, 2000. 82-B(Supp I): p. 23.

Jordan, L.R., J.L. Olivo, and P.E. Voorhorst, Survivorship analysis of cementless meniscal bearing total knee arthroplasty. Clin Orthop, 1997(338): p. 119-23.

List of Peer Reviewed Articles Included in Summary - Continued

Jordan, L.R., et al., The clinical history of mobile-bearing patella components in total knee arthroplasty. Orthopedics, 2002. 25(2 Suppl): p. s247-50.

Kaper, B.P., et al., Medium-term results of a mobile bearing total knee replacement. Clin Orthop, 1999(367): p. 201-9.

Keyes, G., P. Kanabar, and C. Das, An independent prospective study of the Oxford Medial Unicompartmental knee replacement (Abstract Only). J Bone Joint Surg Br, 2000. 82-B(Supp I): p. 23.

Kim, Y.H., H.K. Kook, and J.S. Kim, Comparison of fixed-bearing and mobile-bearing total knee arthroplasties. Clin Orthop, 2001(392): p. 101-15.

Kumar, A. and N. Fiddian, Medial unicompartmental arthroplasty of the knee. Knee, 1999. 6: p. 21-3.

Malkani, A.L., et al., Total knee arthroplasty with the kinematic condylar prosthesis. A ten-year follow-up study. J Bone Joint Surg Am, 1995. 77(3): p. 423-31.

McLardy-Smith, P., et al. Results of the Oxford medial unicompartmental knee arthroplasty in patients under 60 (Abstract Only). in AAOS Annual Meeting. 2001. San Francisco, CA.
(Hard copy)

Murray, D.W., J.W. Goodfellow, and J.J. O'Connor, The Oxford medial unicompartmental arthroplasty: a ten-year survival study. J Bone Joint Surg Br, 1998. 80(6): p. 983-9.

Ranawat, C.S. and O. Boachie-Adjei, Survivorship analysis and results of total condylar knee arthroplasty. Eight- to 11-year follow-up period. Clin Orthop, 1988(226): p. 6-13.

Ranawat, C.S., et al., Long-term results of the total condylar knee arthroplasty. A 15-year survivorship study. Clin Orthop, 1993(286): p. 94-102.

Rand, J.A. and D.M. Ilstrup, Survivorship analysis of total knee arthroplasty. Cumulative rates of survival of 9200 total knee arthroplasties. J Bone Joint Surg Am, 1991. 73(3): p. 397-409.

Rees, J.L., et al., Medial unicompartmental arthroplasty after failed high tibial osteotomy. J Bone Joint Surg Br, 2001. 83(7): p. 1034-6.

Ritter, M.A., et al., Long-term survival analysis of the posterior cruciate condylar total knee arthroplasty. A 10-year evaluation. J Arthroplasty, 1989. 4(4): p. 293-6.

List of Peer Reviewed Articles Included in Summary - Continued

Ritter, M.A., et al., Long-term followup of anatomic graduated components posterior cruciate-retaining total knee replacement. Clin Orthop, 2001. 388: p. 51-7.

Rosenberg, N. and I. Henderson, Medium term outcome of the LCS cementless posterior cruciate retaining total knee replacements. Follow up and survivorship study of 35 operated knees. Knee, 2001. 8(2): p. 123-8.

Schai, P.A., T.S. Thornhill, and R.D. Scott, Total knee arthroplasty with the PFC system. Results at a minimum of ten years and survivorship analysis. J Bone Joint Surg Br, 1998. 80(5): p. 850-8.

Scuderi, G.R., et al., Survivorship of cemented knee replacements. J Bone Joint Surg Br, 1989. 71(5): p. 798-803.

Sorrells, R.B., The rotating platform mobile bearing TKA. Orthopedics, 1996. 19(9): p. 793-6.

Sorrells, R.B., J.B. Stiehl, and P.E. Voorhorst, Midterm results of mobile-bearing total knee arthroplasty in patients younger than 65 years. Clin Orthop, 2001(390): p. 182-9.

Stern, S.H. and J.N. Insall, Posterior stabilized prosthesis. Results after follow-up of nine to twelve years. J Bone Joint Surg Am, 1992. 74(7): p. 980-6.

Stiehl, J.B. and P.E. Voorhorst, Total knee arthroplasty with a mobile-bearing prosthesis: comparison of retention and sacrifice of the posterior cruciate ligament in cementless implants. Am J Orthop, 1999. 28(4): p. 223-8.

Svard, U.C. and A.J. Price, Oxford medial unicompartmental knee arthroplasty. A survival analysis of an independent series. J Bone Joint Surg Br, 2001. 83(2): p. 191-4.

Weir, D.J., C.G. Moran, and I.M. Pinder, Kinematic condylar total knee arthroplasty. 14-year survivorship analysis of 208 consecutive cases. J Bone Joint Surg Br, 1996. 78(6): p. 907-11.

Table 22 Revision Definitions which led to Implant Survival Estimate Inclusion/Exclusion by Unique Type of Knee Design (or unique group of devices)

Article	Knee Design	Definition of Revision Leading to Inclusion	Definition of Revision Leading to Exclusion
Duffy and Phillipson 2000	Mobile Platform PCL sacrificing	Revision surgery	Failure for Any reason
Kaper et al. 1999	Mobile Platform PCL retaining	Revision surgery for any reason	Revision surgery because of poly wear
Callaghan et al. 2000	Rotating Platform	Reoperation or dislocation	NONE
Sorrells 1996	Rotating Platform	Revision for any reason	NONE
Sorrells 2002	Rotating Platform	Revision for any reason	NONE
Jordan et al. 2002	Mobile Bearing	Revision for any reason	NONE
Jordan et al. 1997	Mobile Bearing	Revision surgery for any mechanical reason	Revision surgery due to mechanical loosening
Kim et al. 2001	Mobile Bearing	Any revision or recommended revision	NONE
Rosenburg & Henderson 2001	Mobile Bearing	Revision for any reason	NONE
Buechel et al. 2001	Cementless MB PCL retaining	Revision for any mechanical reason at 16 years	Poor clinical knee score at 10 years Poor clinical knee score at 16 years Revision for any mechanical reason at 10 years

Revision Definitions which led to Implant Survival Estimate Inclusion/Exclusion by Unique Type of Knee Design (or unique group of devices) - Continued

Article	Knee Design	Definition of Revision Leading to Inclusion	Definition of Revision Leading to Exclusion
Buechel et al. 2001	Cemented RP	Revision for any mechanical reason at 16 years	Poor clinical knee score at 10 years Poor clinical knee score at 16 years Revision for any mechanical reason at 10 years
	Cementless RP	Revision for any mechanical reason at 16 years	Poor clinical knee score at 10 years Poor clinical knee score at 16 years Revision for any mechanical reason at 10 years
Stiehl & Voorhorst 1999	RP	Revision of metal components	NONE
	MB	Revision of metal components	NONE
Argenson et al. 1993	UM	Revision surgery	NONE
Carr et al. 1993	UM	Need for a revision operation	NONE
Gunther et al. 1996	UM (lateral comp. only)	All revisions	Aseptic loosening Aseptic revisions
Harding et al. 2000	UM Oxford Phase I	Revision surgery	NONE
	UM Oxford Phase II	Revision surgery	NONE

Revision Definitions which led to Implant Survival Estimate Inclusion/Exclusion by Unique Type of Knee Design (or unique group of devices) - Continued

Article	Knee Design	Definition of Revision Leading to Inclusion	Definition of Revision Leading to Exclusion
Keys et. al. 2000	UM	Revision, impending revision, or pain scores	NONE
Kumar & Fiddian 1999	UM	Revision surgery	NONE
McLardy-Smith et al. 2001	UM	All cause revision patients < 60	NONE
	UM	All cause revision patients > 60	NONE
Murray et al. 1998	UM	Revision and lost to follow up considered failures	NONE
Rees et al. 2001	UM	Revision surgery	NONE
Svard et al. 2001	UM	Revision for any cause	NONE
Colizza et al. 1995	Posterior stabilized	Any revision or planned rev Lost-to-followup considered withdrawals	Any revision or planned rev Lost-to-followup considered failures
Diduch et al. 1997	Posterior stabilized	Revision for any reason	Revision of femoral or tibial component Rev. of femoral, tibial, or patellar component
Emmerson et al. 1996	Posterior stabilized	Revision of the implant at 13 years	Revision of the implant at 10 years

Revision Definitions which led to Implant Survival Estimate Inclusion/Exclusion by Unique Type of Knee Design (or unique group of devices) - Continued

Article	Knee Design	Definition of Revision Leading to Inclusion	Definition of Revision Leading to Exclusion
Font-Rodriguez et al. 1997	Total condylar	Any revision or recommended revision Lost-to-followup considered withdrawals	Any revision or recommended revision Lost-to-followup considered failures
	Posterior stabilized (All poly tibia)	Any revision or recommended revision Lost-to-followup considered withdrawals	Any revision or recommended revision Lost-to-followup considered failures
	Posterior stabilized (Metal backed tibia)	Any revision or recommended revision Lost-to-followup considered withdrawals	Any revision or recommended revision Lost-to-followup considered failures
	Posterior stabilized (Modular augmented components)	Any revision or recommended revision Lost-to-followup considered withdrawals	Any revision or recommended revision Lost-to-followup considered failures
	Constrained condylar	Any revision or recommended revision Lost-to-followup considered withdrawals	Any revision or recommended revision Lost-to-followup considered failures

Revision Definitions which led to Implant Survival Estimate Inclusion/Exclusion by Unique Type of Knee Design (or unique group of devices) - Continued

Article	Knee Design	Definition of Revision Leading to Inclusion	Definition of Revision Leading to Exclusion
Gill et al. 1999	Total condylar (PCL retaining)	Any revision at 20 years	Any revision at 15 years Any revision or recommended revision at 15 years Any revision or recommended revision at 20 years
Kim et. al. 2001	MB	Any revision or recommended revision	Aseptic Loosening
Malkani et al. 1995	Total condylar (PCL retaining)	Revision	Poor pain score (Knee society score) Revision or poor knee score (HSS) Revision, poor knee score (HSS), or presence of radiolucent line
Ranawat et al. 1988	Total condylar	Any revision or recommended revision	Any revision or recommended revision or presence of a radiolucent line with pain
Ranawat et al. 1993	Total condylar	Any revision or recommended revision	Any revision or recommended revision or presence of a radiolucent line with pain

Revision Definitions which led to Implant Survival Estimate Inclusion/Exclusion by Unique Type of Knee Design (or unique group of devices) - Continued

Article	Knee Design	Definition of Revision Leading to Inclusion	Definition of Revision Leading to Exclusion
Rand et al. 1991	Older resurfacing*	Revision of an implant at 10 Years	Revision of an implant at 2 Years Revision of an implant at 5 Years
	Older constrained**	Revision of an implant at 10 Years	Revision of an implant at 2 Years Revision of an implant at 5 Years
	Resurfacing, non-metal-backed	Revision of an implant at 10 Years	Revision of an implant at 2 Years Revision of an implant at 5 Years
	Condylar resurfacing metal-backed tibia	Revision of an implant at 5 Years	Revision of an implant at 2 Years Revision of an implant at 10 Years
	Posterior stabilized	Revision of an implant at 5 Years	Revision of an implant at 2 Years Revision of an implant at 10 Years
	Newer constrained Unicompartmental	Revision of an implant at 5 Years	Revision of an implant at 2 Years Revision of an implant at 10 Years

* Includes – Guepar, Walldius, Tavernetti, Herbert, Sheehan, and Spherocentric devices.
* * Includes –Total Condylar, Anametric, Duopatellar, and Freeman-Swanson devices.

Revision Definitions which led to Implant Survival Estimate Inclusion/Exclusion by Unique Type of Knee Design (or unique group of devices) - Continued

Article	Knee Design	Definition of Revision Leading to Inclusion	Definition of Revision Leading to Exclusion
Rand et al. 1991	Other cemented	Revision of an implant at 5 Years	Revision of an implant at 2 Years Revision of an implant at 10 Years
	Condylar resurfacing without cement	Revision of an implant at 5 Years	Revision of an implant at 2 Years Revision of an implant at 10 Years
Ritter et al. 1989	Total condylar (PCL retaining)	Revision due to loosening or X-ray evidence of loosening	Revision due to loosening or X-ray evidence of loosening or HSS Pain Component<15 Revision due to loosening or X-ray evidence of loosening or HSS Pain Component<20
Ritter et al. 2001	Anatomic graduated components	Revision of any component	NONE
Schai et al. 1998	PFC System (PCL retaining)	Reoperation for any reason	NONE
Scuderi et al. 1989	Posterior stabilized (metal backed tibia)	Revision or recommendation	NONE
	Total condylar (all poly tibia)	Revision or recommendation	NONE
	Total condylar (All poly tibia)	Revision or recommendation	NONE
Stern et al. 1992	Posterior stabilized (All poly tibia)	Revision due to failure of arthroplasty	NONE
Weir et al., 1996	Total condylar	Recommendation for revision	NONE

Figure G Implant Survival Estimates by Ln (Knee-Years) Followup – All Published Estimates

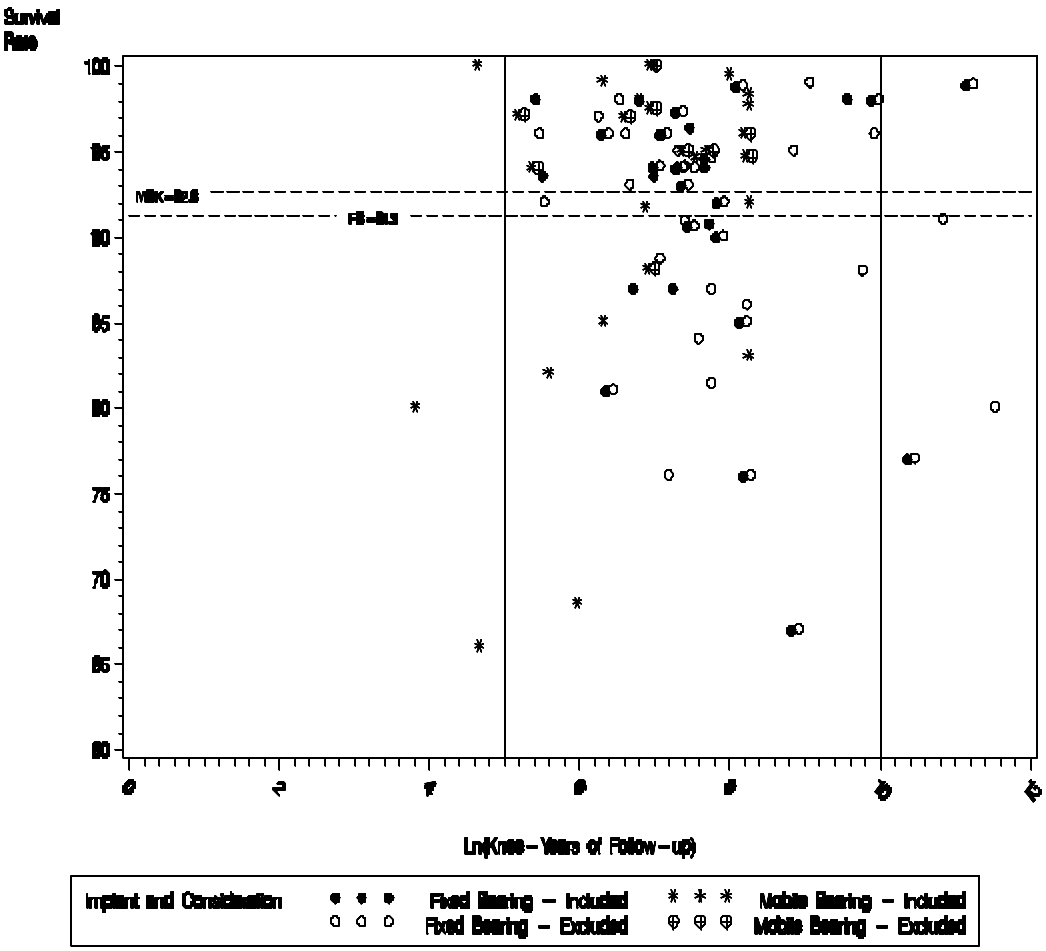
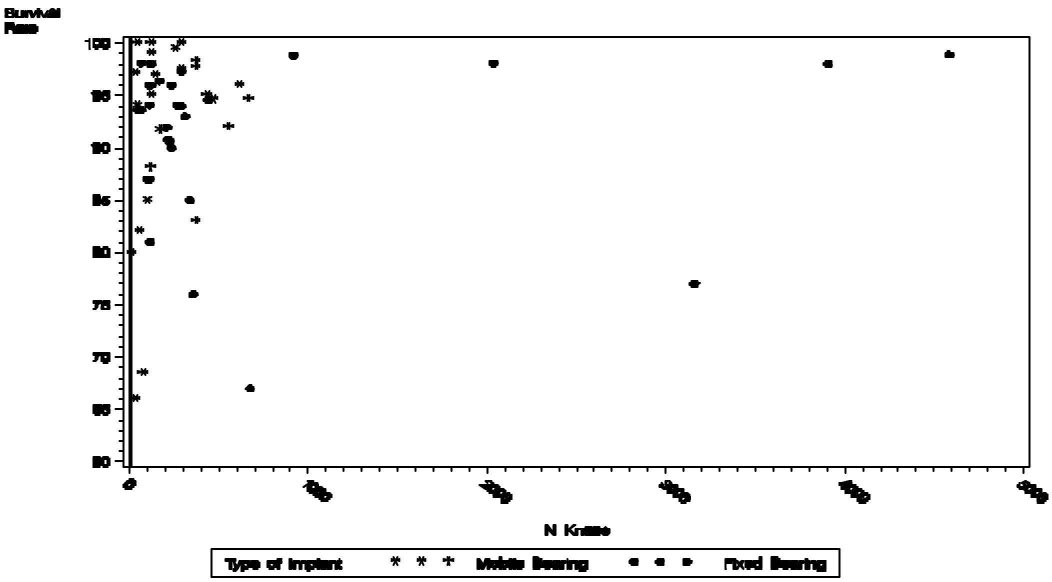


Figure H Plots of Survival versus Potential Weighting Variables

Number of Knee Implants



Ln (Number of Knee Implants)

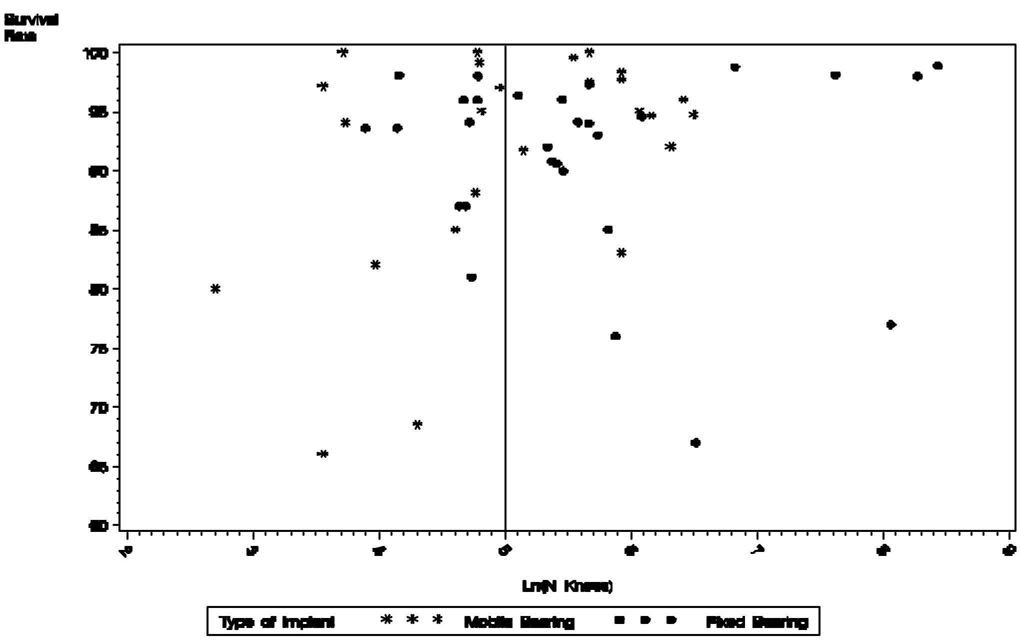
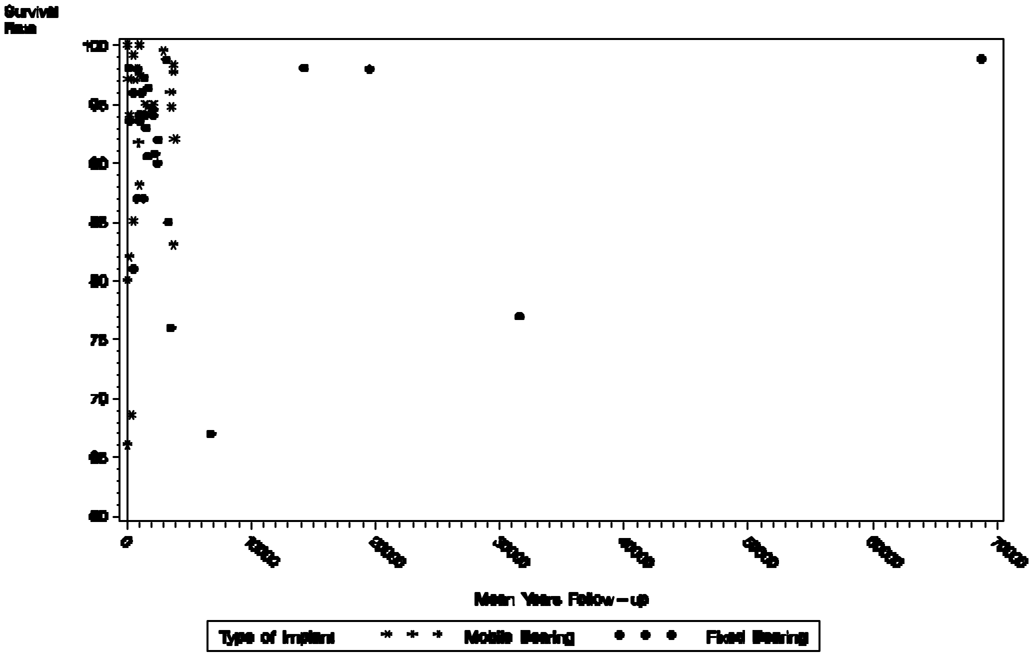


Figure H Plots of Survival versus Potential Weighting Variables (continued)

Mean Years of Follow-up



Ln (Mean Years of Follow-up)

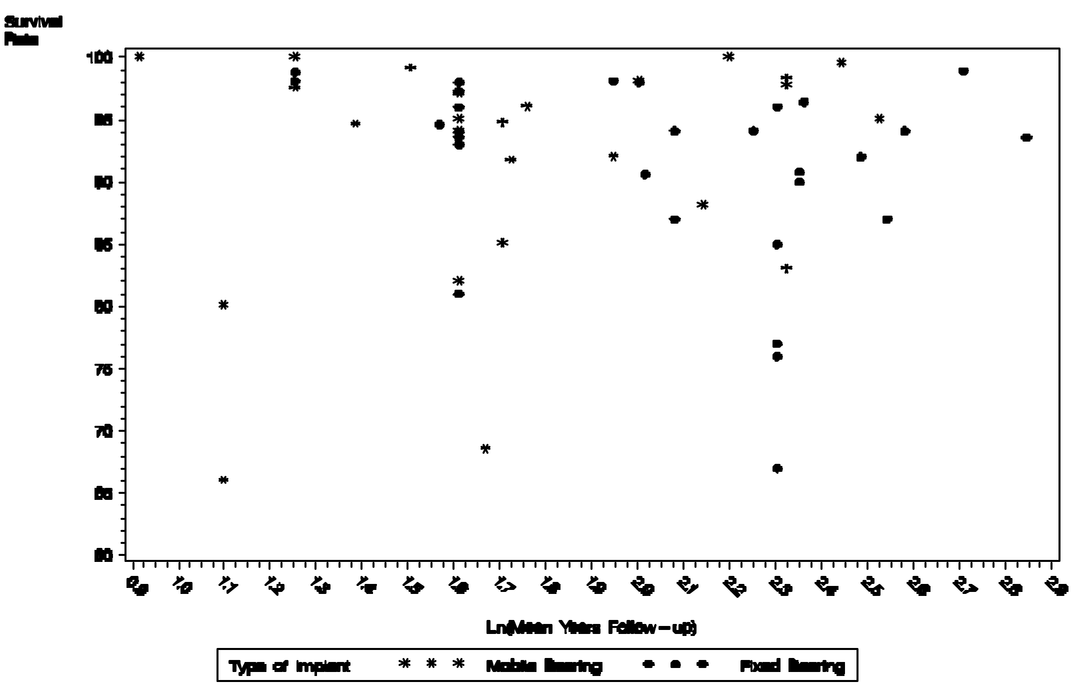
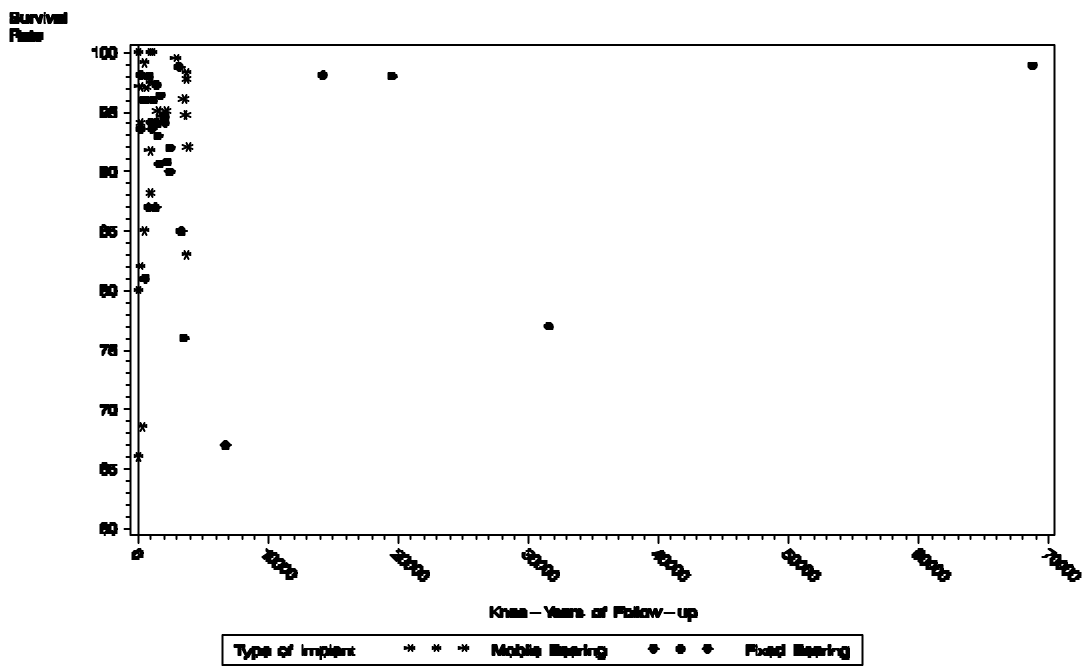


Figure H Plots of Survival versus Potential Weighting Variables (continued)

Knee-Years of Follow-up



Ln (Knee-Years of Follow-up)

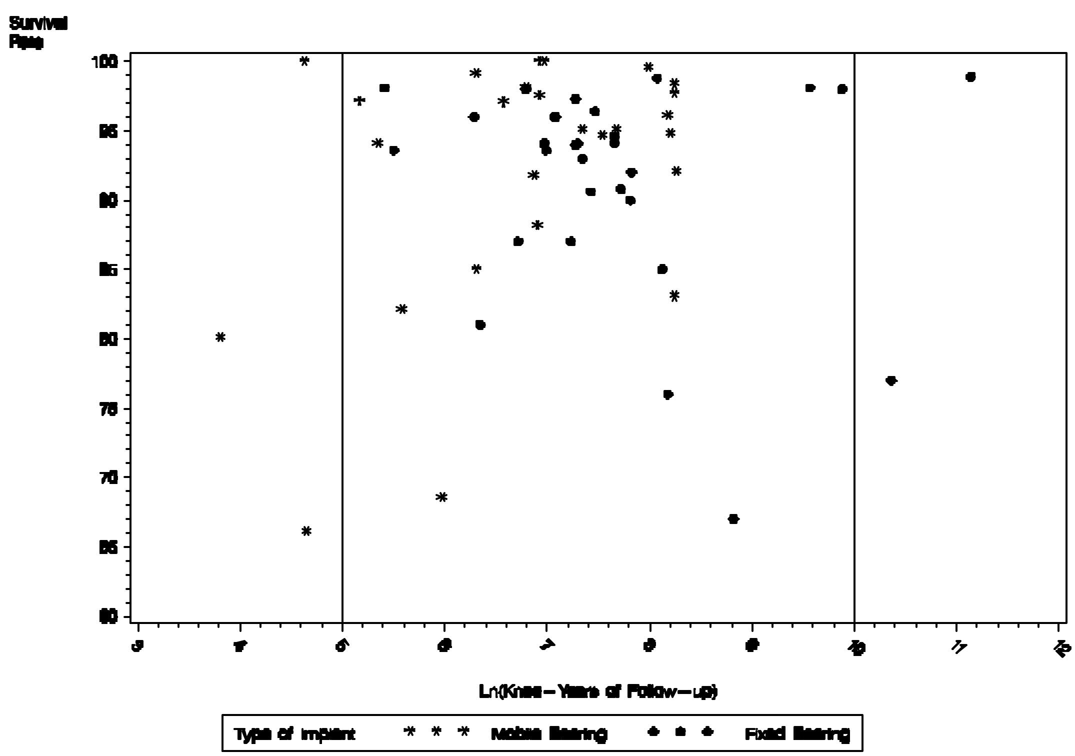


Figure 3 Implant Survival Estimates by Ln (Knee-Years) Followup – All Estimates Included in Analysis