Bone & Joint Research

Supplementary Material

```
Logistic (Proportional Odds) Ordinal Regression Model

 orm(formula = alvalscore ~ logCo * logCr * logTi + Age + TimeFromPrimaryOperation +
     Sex + ImplantModel + ReasonForRevision, data = dfmetalval2.rename,
     x = TRUE, y = TRUE)
```

```
 Frequencies of Responses


  0  1  2  3  4  5  6  7  8
  3  2  5 48 25 20 10  6  2
```

		Model Likelihood Ratio Test		Discrimination Indexes		Rank Discrim. Indexes	
Obs	121	LR chi2	37.89	R2	0.278	rho	0.420
Distinct Y	9	d.f.	18	g	1.206		
Median Y	5	Pr(> chi2) 0.0040		gr	3.339		
max |deriv| 3e-06		Score chi2	45.53	|Pr(Y>=median)-0.5| 0.160			
		Pr(> chi2) 0.0003					

	Coef	S.E.	Wald Z	Pr(>|Z|)
y>=1	3.1076	1.5612	1.99	0.0465
y>=2	2.5706	1.5193	1.69	0.0907
y>=3	1.8180	1.4876	1.22	0.2217
y>=4	-0.7219	1.4686	-0.49	0.6230
y>=5	-1.7645	1.4608	-1.21	0.2271
y>=6	-3.0238	1.4779	-2.05	0.0408

```
y>=7                                           -4.2696 1.5514 -2.75  0.0059
y>=8                                           -6.1362 1.7397 -3.53  0.0004
logCo                                           0.1650 0.1149  1.44  0.1510
logCr                                          -0.2125 0.1424 -1.49  0.1355
logTi                                          -0.0210 0.1611 -0.13  0.8962
Age                                             0.0114 0.0216  0.53  0.5988
TimeFromPrimaryOperation                        0.0095 0.0373  0.26  0.7980
Sex=Male                                       -0.4664 0.4261 -1.09  0.2737
ImplantModel=Other                             -0.0544 0.7853 -0.07  0.9447
ImplantModel=Oxford                            -0.8670 0.6044 -1.43  0.1514
ImplantModel=PFC                                0.2356 0.5742  0.41  0.6816
ImplantModel=Triathlon                         -1.1798 0.7834 -1.51  0.1321
ImplantModel=Vanguard                          -0.4549 1.0782 -0.42  0.6731
ReasonForRevision=Malalignment                 -0.6732 0.5971 -1.13  0.2596
ReasonForRevision=Other                         0.5599 0.4695  1.19  0.2330
ReasonForRevision=Prosthetic joint infection   3.7095 0.9491  3.91  <0.0001
logCo * logCr                                   0.0774 0.0495  1.56  0.1180
logCo * logTi                                  -0.0473 0.0891 -0.53  0.5957
logCr * logTi                                   0.1374 0.1032  1.33  0.1830
logCo * logCr * logTi                          -0.0179 0.0392 -0.46  0.6479
```

Fig a. Logistic regression model for total aseptic lymphocyte-dominated vasculitis-associated lesions (ALVAL) score.

Logistic (Proportional Odds) Ordinal Regression Model

```
orm(formula = inflammatoryinfiltrate ~ logCo * logCr * logTi +
    Age + TimeFromPrimaryOperation + Sex + ImplantModel + ReasonForRevision,
    data = dfmetalval2.rename, x = TRUE, y = TRUE)
```

Frequencies of Responses

```
 0  1  2  3
 7 77 35  2
```

		Model Likelihood Ratio Test		Discrimination Indexes		Rank Discrim. Indexes	
Obs	121	LR chi2	30.53	R2	0.269	rho	0.470
Distinct Y	4	d.f.	18	g	1.303		
Median Y	2	Pr(> chi2)	0.0326	gr	3.680		
max |deriv|	6e-06	Score chi2	29.54	|Pr(Y>=median)-0.5|	0.442		
		Pr(> chi2)	0.0422				

	Coef	S.E.	Wald Z	Pr(>|Z|)
y>=1	0.1366	1.7467	0.08	0.9377
y>=2	-4.1469	1.7964	-2.31	0.0210
y>=3	-7.8746	1.9785	-3.98	<0.0001
logCo	0.0569	0.1327	0.43	0.6679
logCr	0.0173	0.1707	0.10	0.9191
logTi	-0.2512	0.1985	-1.27	0.2057
Age	0.0439	0.0258	1.70	0.0888
TimeFromPrimaryOperation	0.0177	0.0432	0.41	0.6827
Sex=Male	-0.4922	0.5162	-0.95	0.3404
ImplantModel=Other	-1.6603	0.9553	-1.74	0.0822
ImplantModel=Oxford	0.9008	0.7220	1.25	0.2122
ImplantModel=PFC	-0.2176	0.6914	-0.31	0.7530
ImplantModel=Triathlon	-0.9858	0.9390	-1.05	0.2938
ImplantModel=Vanguard	0.4336	1.2109	0.36	0.7203
ReasonForRevision=Malalignment	-0.0937	0.7208	-0.13	0.8966
ReasonForRevision=Other	0.3603	0.5375	0.67	0.5027
ReasonForRevision=Prosthetic joint infection	2.3692	1.0227	2.32	0.0205
logCo * logCr	0.0739	0.0595	1.24	0.2142

```
logCo * logTi                        -0.0790 0.1076 -0.73  0.4628

logCr * logTi                         0.0965 0.1269  0.76  0.4472

logCo * logCr * logTi                -0.0257 0.0468 -0.55  0.5825
```

Fig b. Logistic regression model for inflammatory infiltrate.

Logistic (Proportional Odds) Ordinal Regression Model

```
orm(formula = synoviallining ~ logCo * logCr * logTi + Age +
    TimeFromPrimaryOperation + Sex + ImplantModel + ReasonForRevision,
    data = dfmetalval2.rename, x = TRUE, y = TRUE)
```

Frequencies of Responses

```
 0  1  2  3
 8 78 26  9
```

	Model Likelihood Ratio Test		Discrimination Indexes		Rank Discrim. Indexes	
Obs	121	LR chi2	44.38	R2	0.357	rho	0.507
Distinct Y	4	d.f.	18	g	1.612		
Median Y	2	Pr(> chi2) 0.0005		gr	5.011		
max |deriv| 0.001		Score chi2	46.71	|Pr(Y>=median)-0.5| 0.437			
		Pr(> chi2) 0.0002					

	Coef	S.E.	Wald Z	Pr(>|Z|)
y>=1	2.4780	1.6924	1.46	0.1431
y>=2	-2.0459	1.6599	-1.23	0.2177
y>=3	-4.2476	1.7296	-2.46	0.0141
logCo	0.2090	0.1393	1.50	0.1335
logCr	-0.3425	0.1775	-1.93	0.0537
logTi	0.0322	0.1910	0.17	0.8659
Age	0.0105	0.0242	0.43	0.6646
TimeFromPrimaryOperation	0.0413	0.0443	0.93	0.3515
Sex=Male	-0.2652	0.4818	-0.55	0.5820
ImplantModel=Other	-0.0032	0.9330	0.00	0.9972
ImplantModel=Oxford	-1.9786	0.7516	-2.63	0.0085
ImplantModel=PFC	0.4532	0.6391	0.71	0.4783
ImplantModel=Triathlon	-0.9415	0.9333	-1.01	0.3131
ImplantModel=Vanguard	-1.2301	1.2487	-0.99	0.3246
ReasonForRevision=Malalignment	-1.4602	0.7651	-1.91	0.0563
ReasonForRevision=Other	0.6019	0.5335	1.13	0.2593
ReasonForRevision=Prosthetic joint infection	2.8870	0.9298	3.10	0.0019
logCo * logCr	0.0760	0.0608	1.25	0.2114

```
logCo * logTi                          -0.0528 0.1053 -0.50  0.6160

logCr * logTi                           0.1298 0.1266  1.03  0.3051

logCo * logCr * logTi                   0.0004 0.0469  0.01  0.9940
```

Fig c. Logistic regression model for synovial lining.

Logistic (Proportional Odds) Ordinal Regression Model

```
orm(formula = tissueorganisation ~ logCo * logCr * logTi + Age +
    TimeFromPrimaryOperation + Sex + ImplantModel + ReasonForRevision,
    data = dfmetalval2.rename, x = TRUE, y = TRUE)
```

Frequencies of Responses

```
 0  1  2  3
 5 73 39  4
```

		Model Likelihood Ratio Test			Discrimination Indexes		Rank Discrim. Indexes
Obs	121	LR chi2	44.80	R2		0.369	rho	0.550
Distinct Y	4	d.f.	18	g		1.603	
Median Y	2	Pr(> chi2)	0.0004	gr		4.966	
max |deriv|	0.007	Score chi2	43.39	|Pr(Y>=median)-0.5|	0.460		
		Pr(> chi2)	0.0007				

	Coef	S.E.	Wald Z	Pr(>|Z|)
y>=1	4.4375	1.7953	2.47	0.0134
y>=2	-0.1905	1.7077	-0.11	0.9112
y>=3	-4.0569	1.8664	-2.17	0.0297
logCo	0.2204	0.1398	1.58	0.1149
logCr	-0.3227	0.1774	-1.82	0.0689
logTi	0.0624	0.1966	0.32	0.7508
Age	-0.0069	0.0253	-0.27	0.7836
TimeFromPrimaryOperation	-0.0150	0.0449	-0.33	0.7383
Sex=Male	0.1092	0.4915	0.22	0.8243
ImplantModel=Other	0.9133	0.9012	1.01	0.3109
ImplantModel=Oxford	-1.5522	0.7597	-2.04	0.0410
ImplantModel=PFC	0.5165	0.6361	0.81	0.4168
ImplantModel=Triathlon	-1.6846	0.9932	-1.70	0.0899
ImplantModel=Vanguard	-1.0425	1.2741	-0.82	0.4133
ReasonForRevision=Malalignment	-0.8260	0.7264	-1.14	0.2555
ReasonForRevision=Other	0.0167	0.5356	0.03	0.9752
ReasonForRevision=Prosthetic joint infection	3.2929	1.1051	2.98	0.0029
logCo * logCr	0.0829	0.0610	1.36	0.1744

```
logCo * logTi                         -0.0478 0.1031 -0.46  0.6431

logCr * logTi                          0.1258 0.1250  1.01  0.3142

logCo * logCr * logTi                 -0.0109 0.0461 -0.24  0.8121
```

Fig d. Logistic regression model for tissue organization.

```
logCo * logTi                         -0.0478 0.1031 -0.46  0.6431

logCr * logTi                          0.1258 0.1250  1.01  0.3142

logCo * logCr * logTi                 -0.0109 0.0461 -0.24  0.8121
```