Why is there a difference in patient survival between renal units: is lead-time bias a factor?

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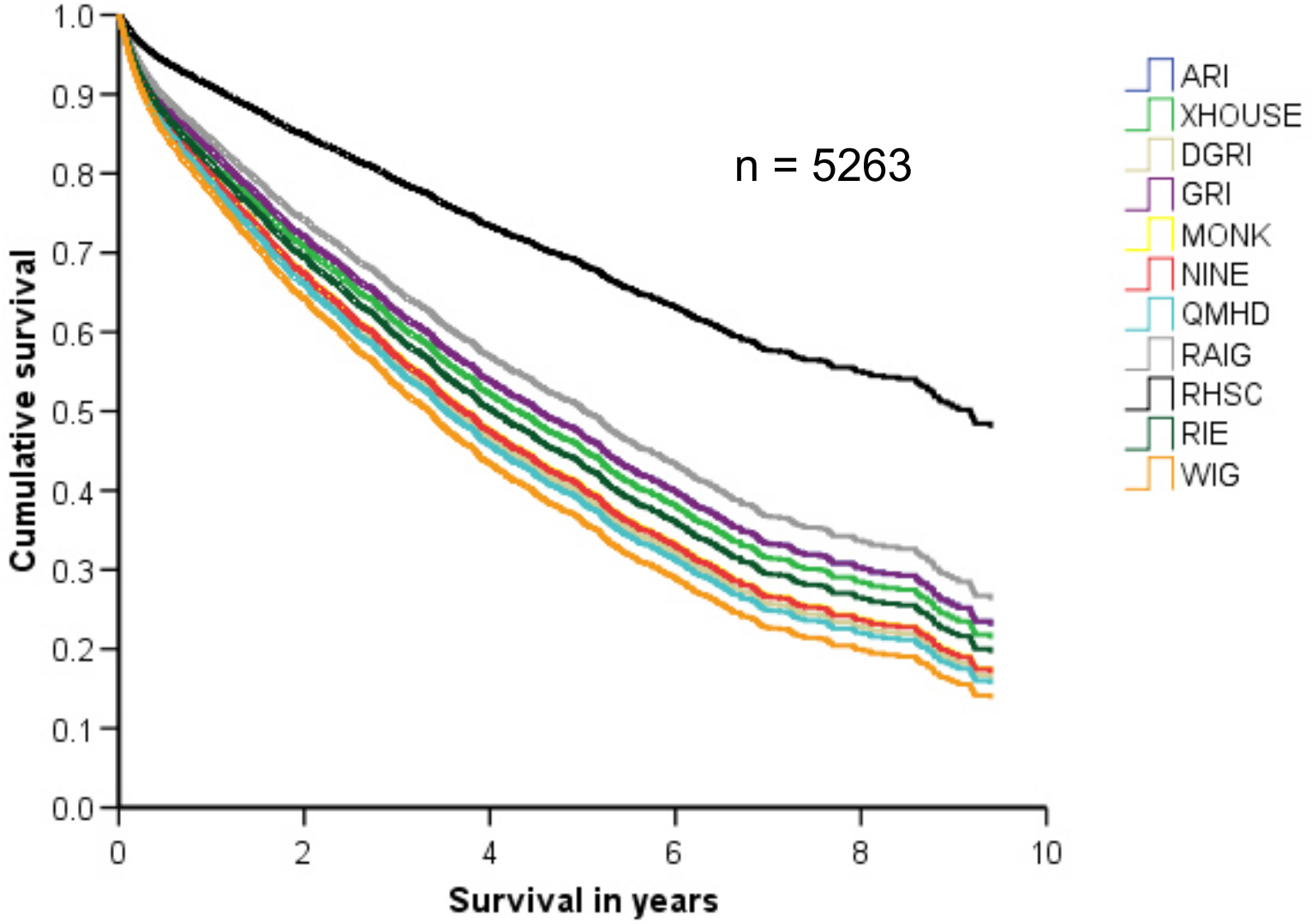
Survival per unit adjusted for age, sex and PRD 1995 - 2004



Survival per unit

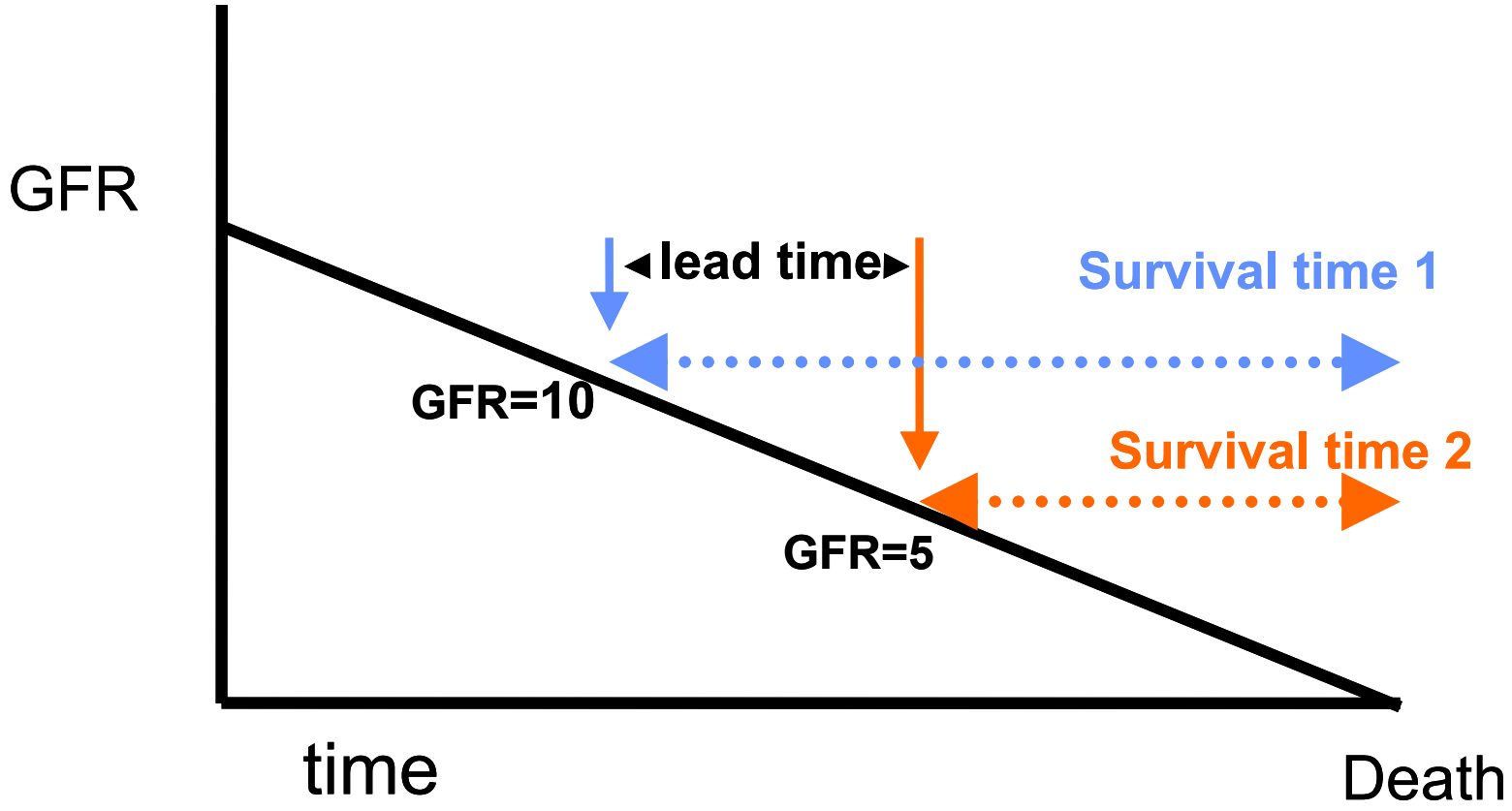
	Unadjusted			Adjusted		
	Hazard ratio	95% CI		**Hazard ratio**	95% CI	
CROSSHOUSE	1.00			**1.00**		
RAIG	0.90	0.71	1.16	**0.87**	0.68	1.11
ARI	1.02	0.84	1.25	**0.95**	0.78	1.16
GRI	1.00	0.83	1.20	**0.95**	0.79	1.14
RIE	1.01	0.84	1.21	**1.06**	0.88	1.27
MONK	1.09	0.88	1.34	**1.14**	0.93	1.41
NINE	1.37	1.13	1.65	**1.15**	0.95	1.39
DGRI	1.35	1.06	1.72	**1.18**	0.92	1.50
QMHD	1.34	1.08	1.67	**1.20**	0.97	1.49
WIG	1.32	1.10	1.57	**1.28**	1.08	1.53
RHSC	0.10	0.03	0.30	**0.48**	0.15	1.51

But…

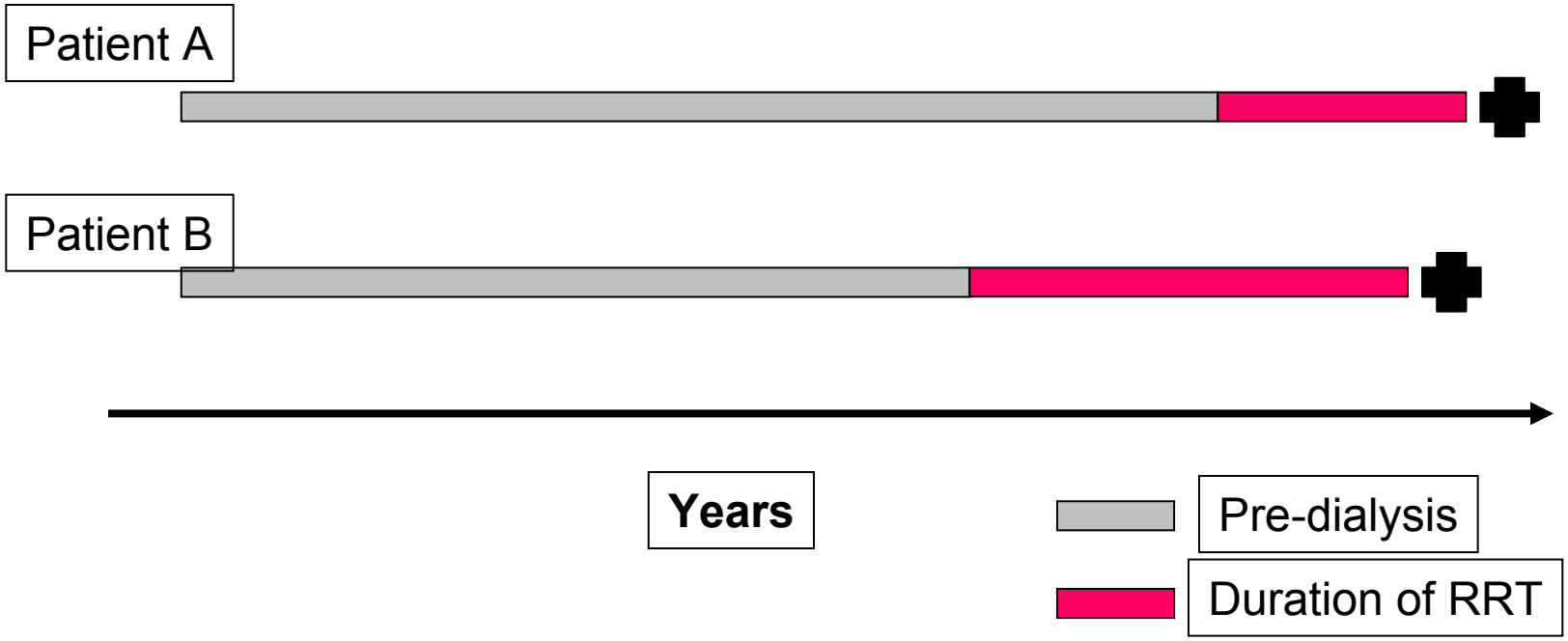
Effects of lead time bias?

Ideally survival should be timed from a point before starting dialysis e.g. eGFR of 20mls/min

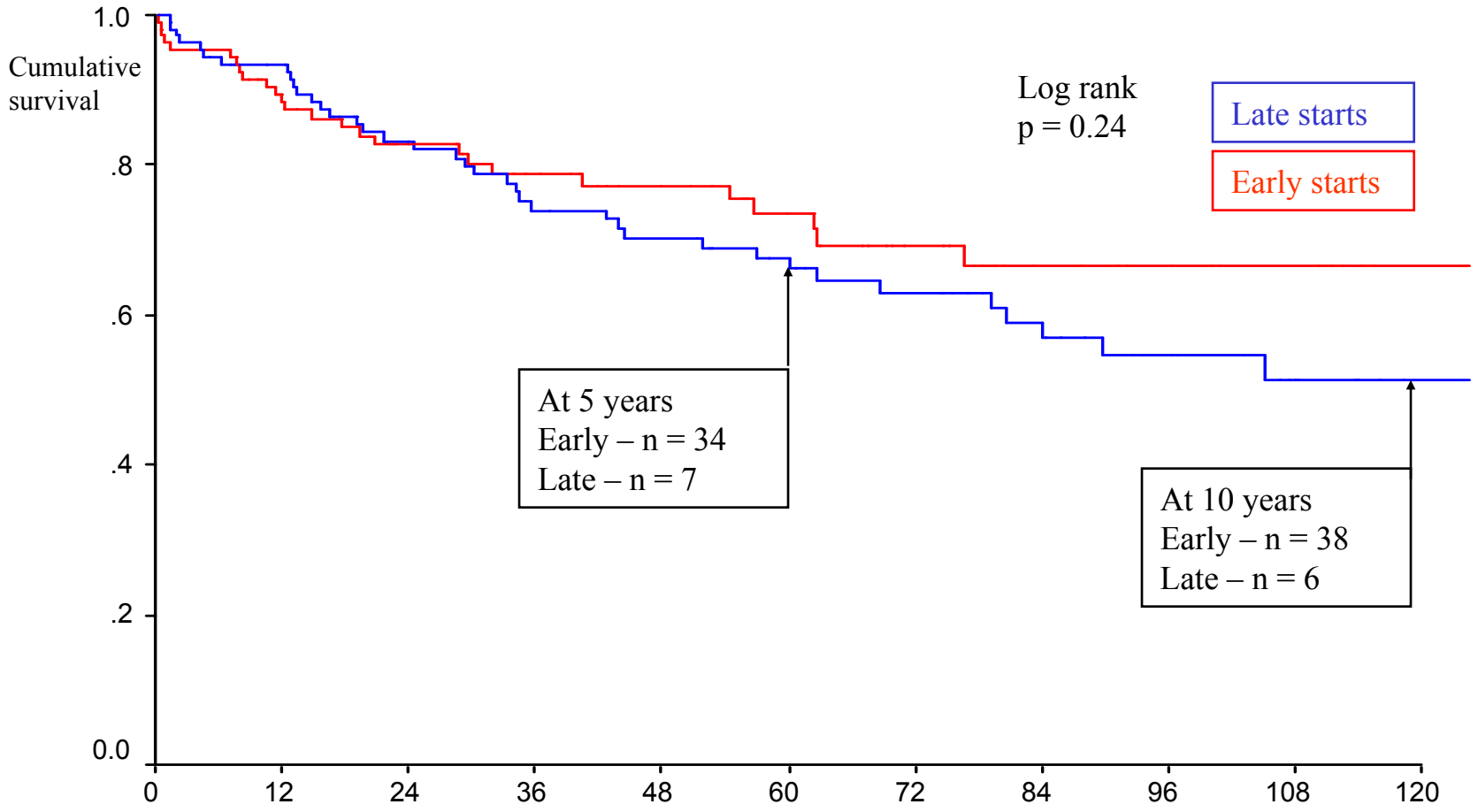
Lead time bias



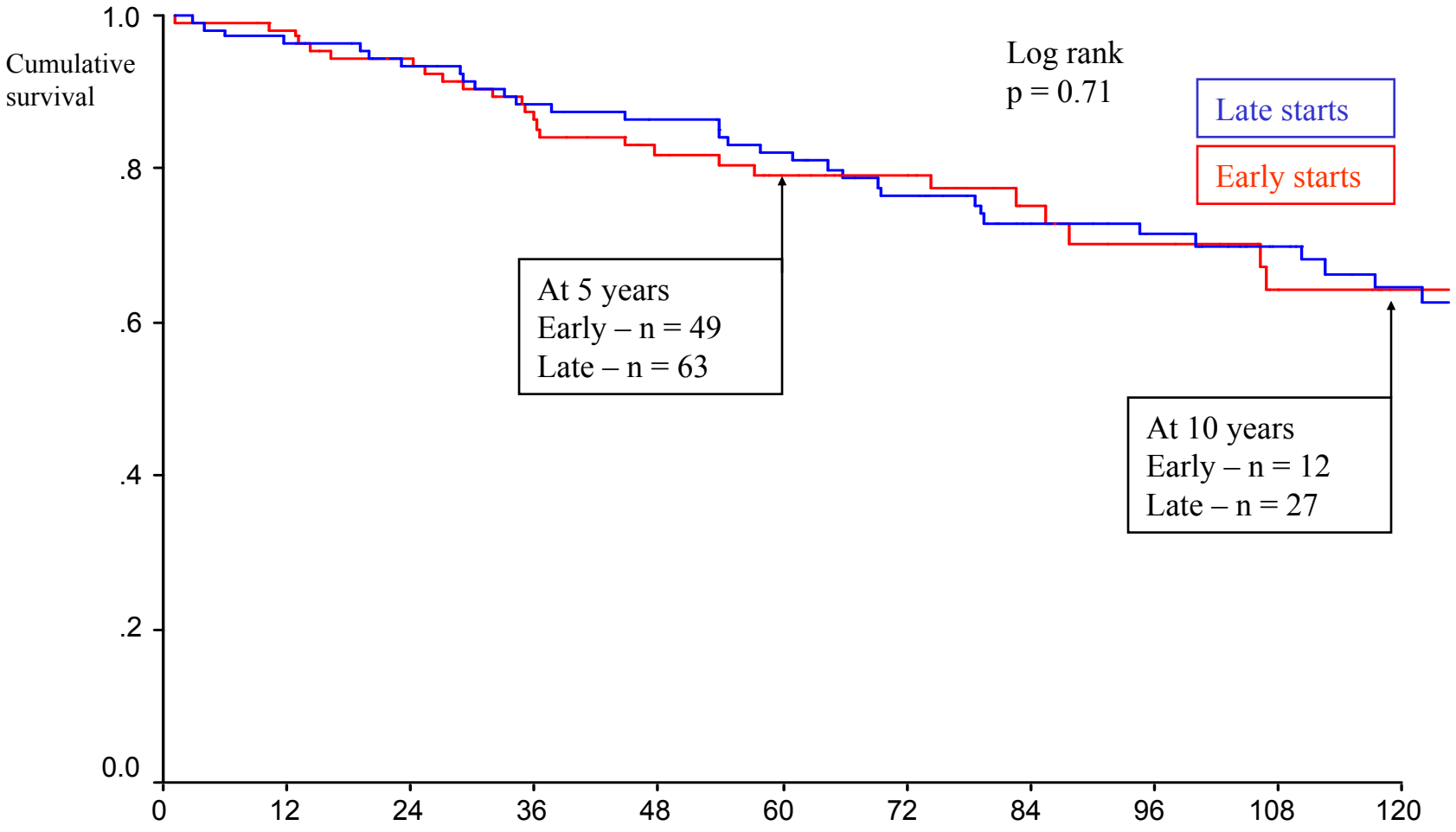
Lead-time bias



10 year survival for late and early initiation of dialysis excluding diabetes n = 215



10 year survival for late and early initiation of dialysis excluding diabetes n = 215



ECC of 20 to endpoint in months

Lead-time bias and outcome

Author	Journal	Conclusions
Traynor et al	JASN 2002	No significant survival between the 2 groups when lead time bias taken into account eCcr assoc with HR 1.1 (p = 0.02)
Korevaar et al	Lancet 2001	Estimated survival better for early starts (2.5 months) but… Improved survival probably due to lead time bias (had to start 4.1-8.3 months earlier)

Present study

Attempt to remove LTB from SRR survival data

Estimate slope for each PRD code and then predict date eGFR = 20 ml/min based on date and eGFR at start of RRT

Present study

Search GRI Proton EPR for all patients starting dialysis for ESRD

989 patients with at least 6 data points

Estimated slope ml/min per day

Primary Renal Diagnosis	ml/min/day	ml/min/month
PRD 1 (Glomerulonehritis)	-0.023444502	-0.70333506
PRD 2 (Interstitial disease)	-0.010565397	-0.31696191
PRD 3 (multi-system disease)	-0.02224748	-0.6674244
PRD 4 (Diabetes)	-0.019307523	-0.57922569
PRD 5 (unknown)	-0.014054763	-0.42164289

Survival per unit

	Adjusted			Adjusted (post LTB removal)		
	Hazard ratio	95% CI		**Hazard ratio**	95% CI	
CROSSHOUSE	**1.00**	-	-	**0.96**	0.75	1.21
RAIG	**0.87**	0.68	1.11	**0.66**	0.51	0.84
ARI	**0.95**	0.78	1.16	**0.92**	0.77	1.09
GRI	**0.95**	0.79	1.14	**0.87**	0.75	1.01
RIE	**1.06**	0.88	1.27	**1.00**	-	-
MONK	**1.14**	0.93	1.41	**1.25**	1.03	1.52
NINE	**1.15**	0.95	1.39	**1.10**	0.91	1.31
DGRI	**1.18**	0.92	1.50	**1.20**	0.97	1.50
QMHD	**1.20**	0.97	1.49	**1.03**	0.83	1.28
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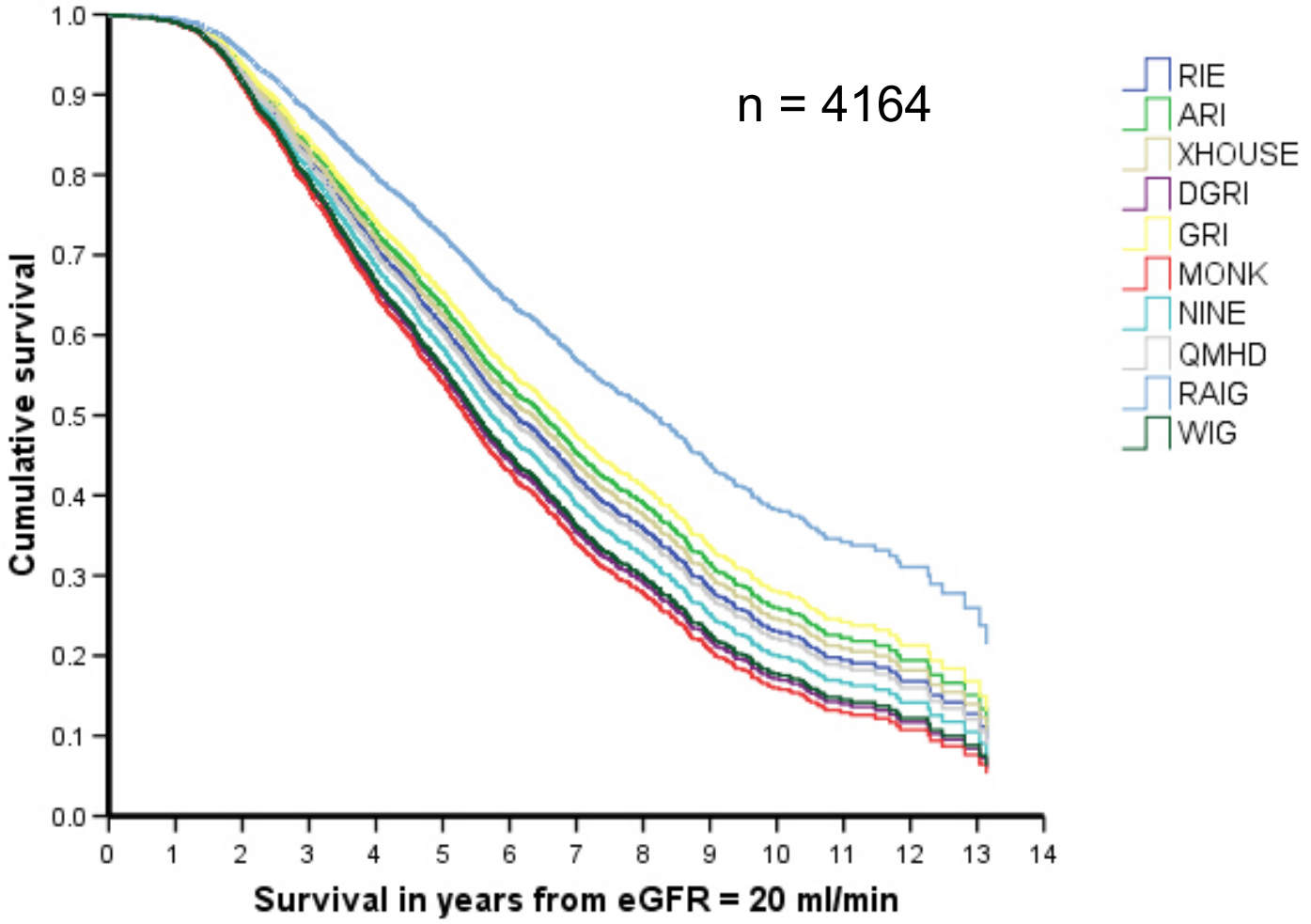
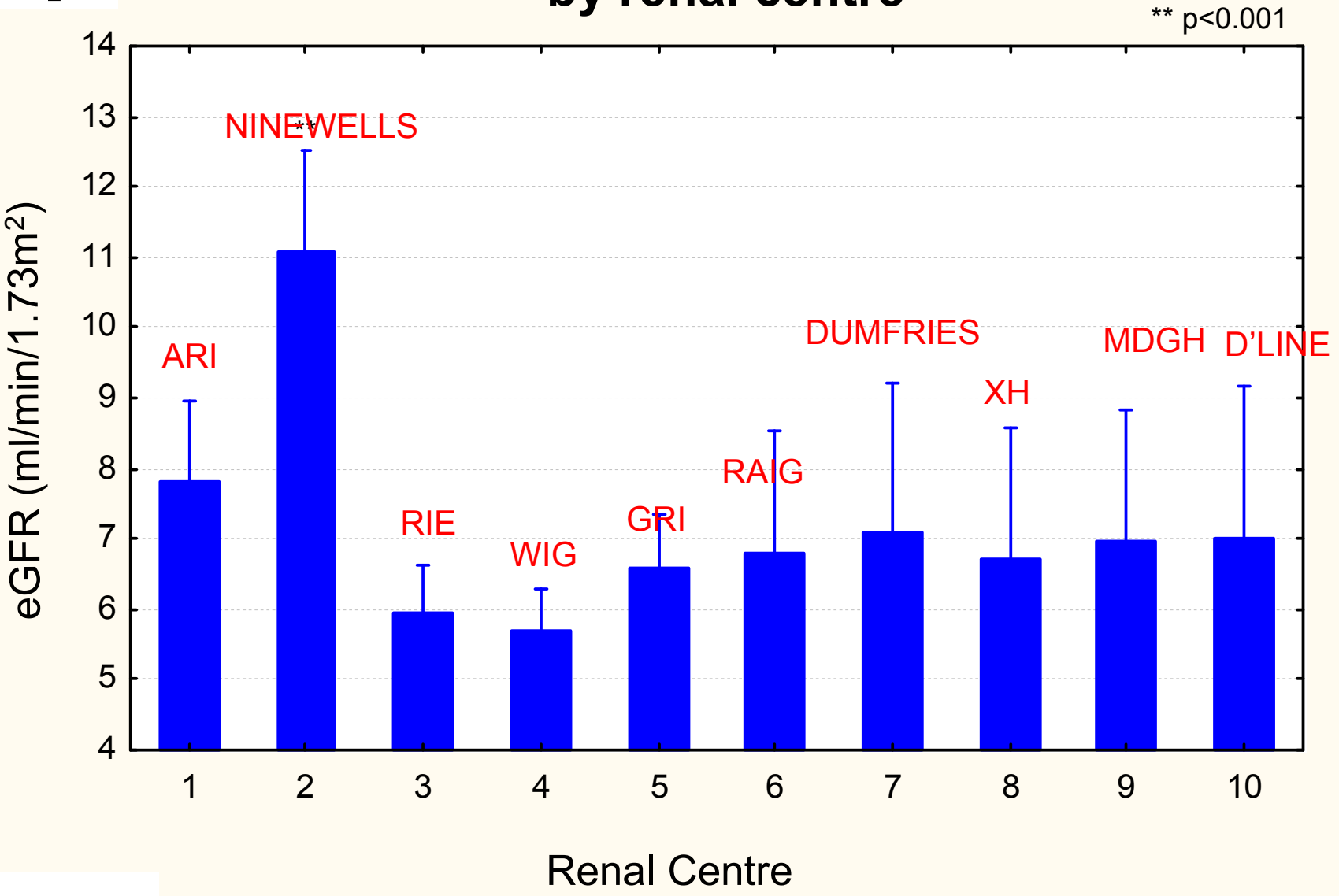
Survival per unit (1995-2004)



With LTB	After removing LTB
RAIGMORE	RAIGMORE
ARI	GRI
GRI	ARI
CROSSHOUSE	CROSSHOUSE
RIE	RIE
MONKLANDS	QMHD
NINEWELLS	NINEWELLS
DGRI	WIG
QMHD	DGRI
WIG	MONKLANDS

Mean (0.95CI) eGFR before 1st RRT for ERF patients with interstitial nephropathy age 18-49 by renal centre



Conclusions

Most units do not shift significantly

Monkland's survival appears worse with survival expressed this way while survival for QMHD appears to be better

Possible explanations

- excess co-morbidity in Lanarkshire
- Monklands CKD patients may be treated better and have lower rate of decline and application of generalised slope will introduce a new form of bias
- ?accuracy of slopes

Conclusions

LTB has limited but real effect on survival data

Must be removed before we consider other issues

?correct approach to removing LTB

- slope for GN seems high but is calculated on those who reached dialysis i.e. progressors
- is calculation of slope as outlined valid/acceptable
- individual approach would require a lot more data
- ? use slope between earliest and last eGFR prior to RRT

Alternative estimated slopes ml/min per month

	Slope 1	Slope include 1st	1st and last
PRD 1 (Glomerulonehritis)	-0.70	-0.59	-0.59
PRD 2 (Interstitial disease)	-0.32	-0.27	-0.28
PRD 3 (multi-system disease)	-0.67	-0.47	-0.54
PRD 4 (Diabetes)	-0.58	-0.62	-0.66
PRD 5 (unknown)	-0.42	-0.38	-0.37

Median time between 1st and last eGFR 35.6 months [IQR 11.0, 81.3]
Median difference between 1st and last eGFR 16.7 ml/min [IQR 6.0, 36.2]