

Fig. 1
Summary Stats
1 Year Mortality

Variable	Outcome=0		Outcome=1		KW Test P Value	sHR(Raw)		sHR(ln)		AuROC	Most
	Median [IQR]	Missing	Median [IQR]	Missing		Est [95% CI]	log-rank p	Est [95% CI]	log-rank p		
NTproBNP pg/ml	1210[458.5-2866]	0	2775.5[1682-5774]	0	<0.001	1.24 [1.12-1.38]	<0.001	2.04 [1.63-2.55]	<0.001	0.702	In
cTnT1	21.09[9.74-37.44]	13	41.16[29.81-67.44]	2	<0.001	1.21 [1.11-1.33]	<0.001	2.09 [1.7-2.56]	<0.001	0.742	In
Creatinine	1.46[1.17-1.97]	3	1.68[1.31-2.29]	0	0.002	1.1 [0.96-1.25]	0.18	1.26 [1.06-1.51]	0.009	0.602	In
eGFR	42.13[29.36-58.99]	13	29.02[21.96-45.73]	2	<0.001	0.52 [0.39-0.69]	<0.001	0.66 [0.55-0.78]	<0.001	0.663	In
SBP	125[110-140]	9	120[103.75-140]	2	0.051	0.81 [0.65-1.02]	0.075	0.8 [0.64-0.99]	0.044	0.565	In
DBP	70[63-80]	9	65.5[60-75]	2	0.004	0.7 [0.55-0.89]	0.004	0.7 [0.56-0.88]	0.002	0.596	In
HGB g/dl	13[11.8-14.3]	0	11.95[10.72-13.28]	0	<0.001	0.63 [0.52-0.76]	<0.001	0.74 [0.65-0.83]	<0.001	0.656	Raw
Age_Yr	69.6[59.6-76.4]	0	77.2[68.7-83.3]	0	<0.001	2.23 [1.68-2.96]	<0.001	2.4 [1.71-3.37]	<0.001	0.695	Raw
ST2 ng/ml	37.1[30.4-48.9]	0	53.3[38.45-89.1]	0	<0.001	1.39 [1.27-1.52]	<0.001	1.82 [1.56-2.13]	<0.001	0.705	In
LVEF	34[26-43]	0	35[25.25-43]	0	0.494	1.08 [0.88-1.33]	0.456	1.1 [0.89-1.36]	0.386	0.522	In
BMI	27[24.5-30.7]	13	25.15[22.8-27.92]	2	<0.001	0.61 [0.47-0.8]	<0.001	0.64 [0.51-0.8]	<0.001	0.625	In
NYHA	1=64;2=545;3=188;4=8	0	1=1;2=39;3=44;4=2	0	<0.001		<0.001				
Ethnicity	1=800;2=5	0	1=86	0	1	0 [0-Inf]	0.475				
Sex	0=230;1=575	0	0=23;1=63	0	0.802	1.1 [0.68-1.77]	0.707				
CAD	0=327;1=478	0	0=39;1=47	0	0.421	0.82 [0.54-1.26]	0.362				
Diabetes	0=523;1=282	0	0=47;1=39	0	0.076	1.5 [0.98-2.29]	0.061				
HTN	0=316;1=489	0	0=31;1=55	0	0.642	1.12 [0.72-1.74]	0.616				

Fig. 2
Summary Stats
Study Mortality

Variable	Outcome=0		Outcome=1		KW Test P Value	sHR(Raw)		sHR(In)		log-rank p	AuROC	Most
	Median [IQR]	Missing	Median [IQR]	Missing		Est [95% CI]	log-rank p	Est [95% CI]	log-rank p			
NTproBNP pg/ml	969.65[364.12-2313.5]	0	2233[922.4-5174]	0	<0.001	1.27 [1.19-1.35]	<0.001	2 [1.77-2.25]	<0.001	0.684	In	
cTnT1	15.65[7.92-30.78]	7	34.18[20.81-53.64]	8	<0.001	1.21 [1.15-1.28]	<0.001	2.01 [1.8-2.24]	<0.001	0.725	In	
Creatinine	1.37[1.12-1.86]	3	1.67[1.33-2.37]	0	<0.001	1.13 [1.06-1.21]	<0.001	1.36 [1.24-1.49]	<0.001	0.643	In	
eGFR	47.73[32.75-65.07]	4	32.45[22.55-44.32]	11	<0.001	0.47 [0.4-0.54]	<0.001	0.63 [0.57-0.69]	<0.001	0.711	In	
SBP	123[110-140]	5	125[110-145]	6	0.409	0.99 [0.89-1.11]	0.879	0.99 [0.88-1.1]	0.817	0.517	In	
DBP	70[65-80]	5	70[60-78]	6	<0.001	0.82 [0.73-0.92]	0.001	0.81 [0.72-0.91]	<0.001	0.571	In	
HGB g/dl	13.2[12-14.5]	0	12.1[11.1-13.6]	0	<0.001	0.68 [0.62-0.75]	<0.001	0.78 [0.73-0.83]	<0.001	0.654	Raw	
Age Yr	66.05[56.58-74.32]	0	75.5[69.6-80.85]	0	<0.001	2.26 [1.95-2.61]	<0.001	2.5 [2.1-2.97]	<0.001	0.737	Raw	
ST2 ng/ml	35.45[29.37-45.4]	0	44.7[34-61.1]	0	<0.001	1.29 [1.22-1.37]	<0.001	1.62 [1.48-1.77]	<0.001	0.662	In	
LVEF	34[26-42.25]	0	34[25-44]	0	0.865	0.98 [0.88-1.09]	0.705	0.95 [0.85-1.06]	0.344	0.503	In	
BMI	27.1[24.7-30.7]	5	26.4[23.6-29.8]	10	0.005	0.79 [0.7-0.9]	<0.001	0.78 [0.7-0.88]	<0.001	0.558	In	
NYHA	1=60;2=418;3=91;4=3	0	1=5;2=166;3=141;4=7	0	<0.001		<0.001					
Ethnicity	1=567;2=5	0	1=319	0	0.166	0 [0-Infl]	0.163					
Sex	0=154;1=418	0	0=99;1=220	0	0.215	0.92 [0.73-1.17]	0.494					
CAD	0=242;1=330	0	0=124;1=195	0	0.321	1.07 [0.86-1.34]	0.537					
Diabetes	0=387;1=185	0	0=183;1=136	0	0.003	1.45 [1.16-1.8]	0.001					
HTN	0=237;1=335	0	0=110;1=209	0	0.045	1.3 [1.04-1.64]	0.024					

Fig. 3 Linearity Check: NT-proBNP

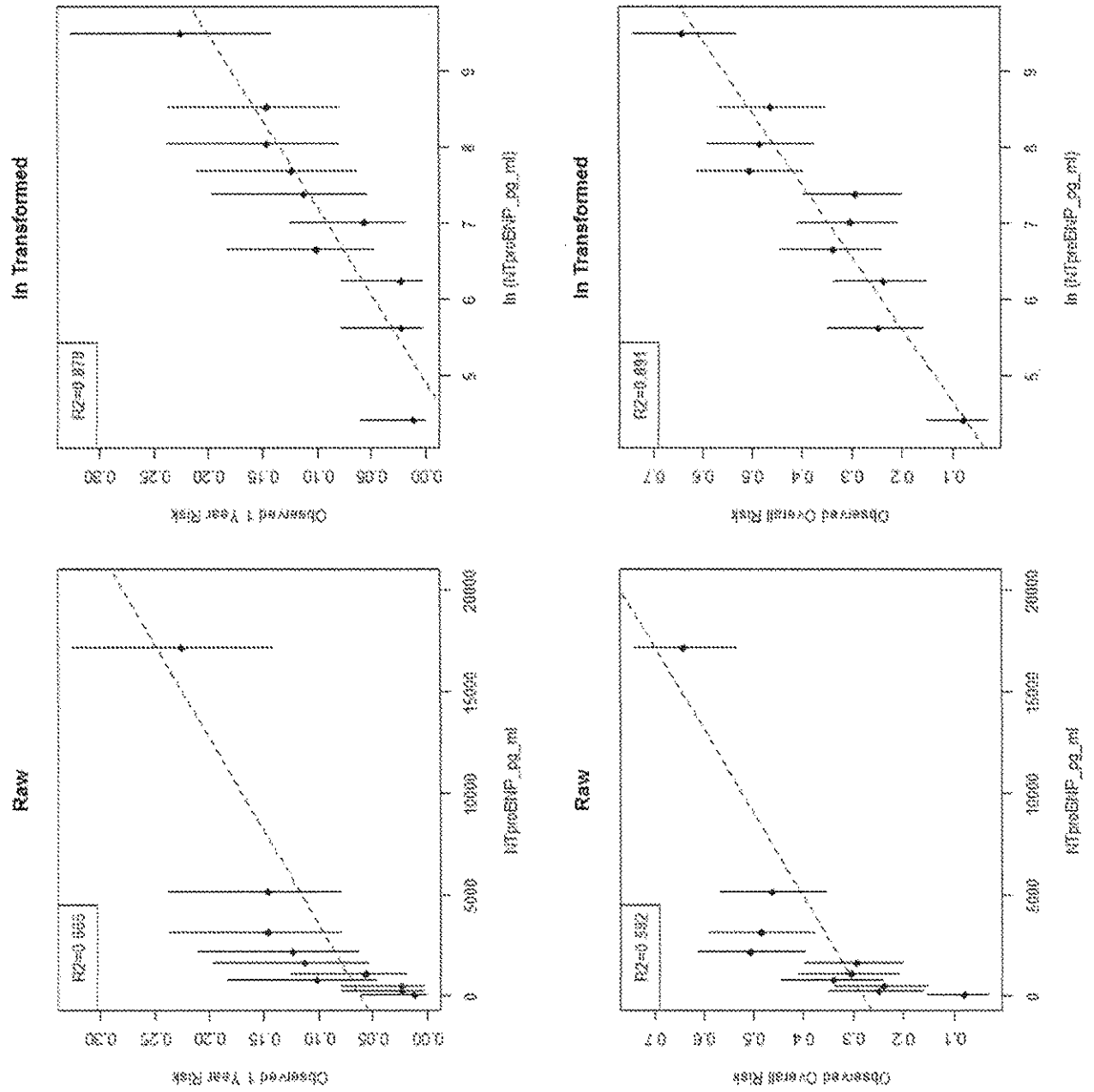


Fig. 4 Cut-Point Evaluation

NT-proBNP

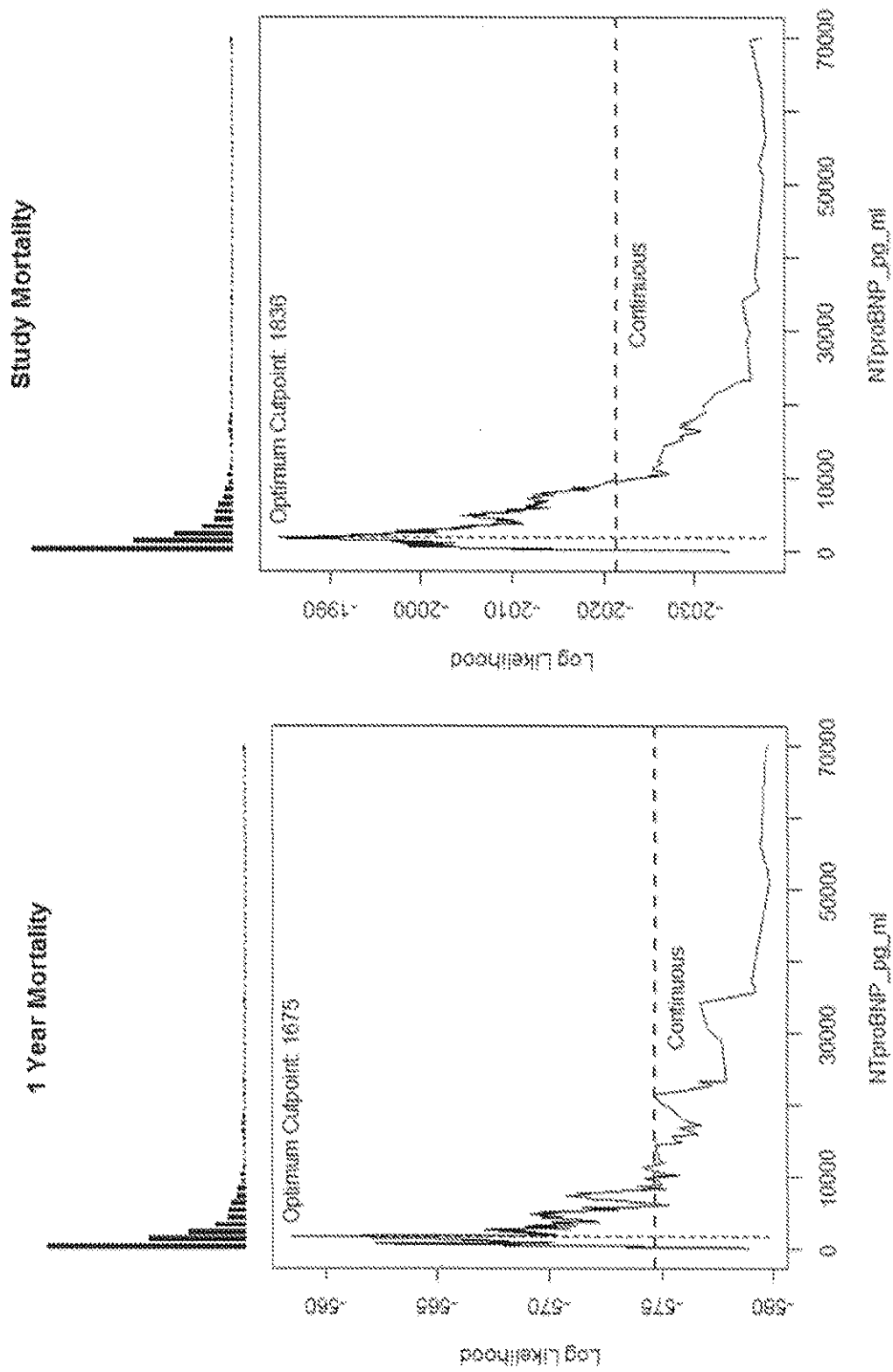


Fig. 5 Linearity Check: Troponin

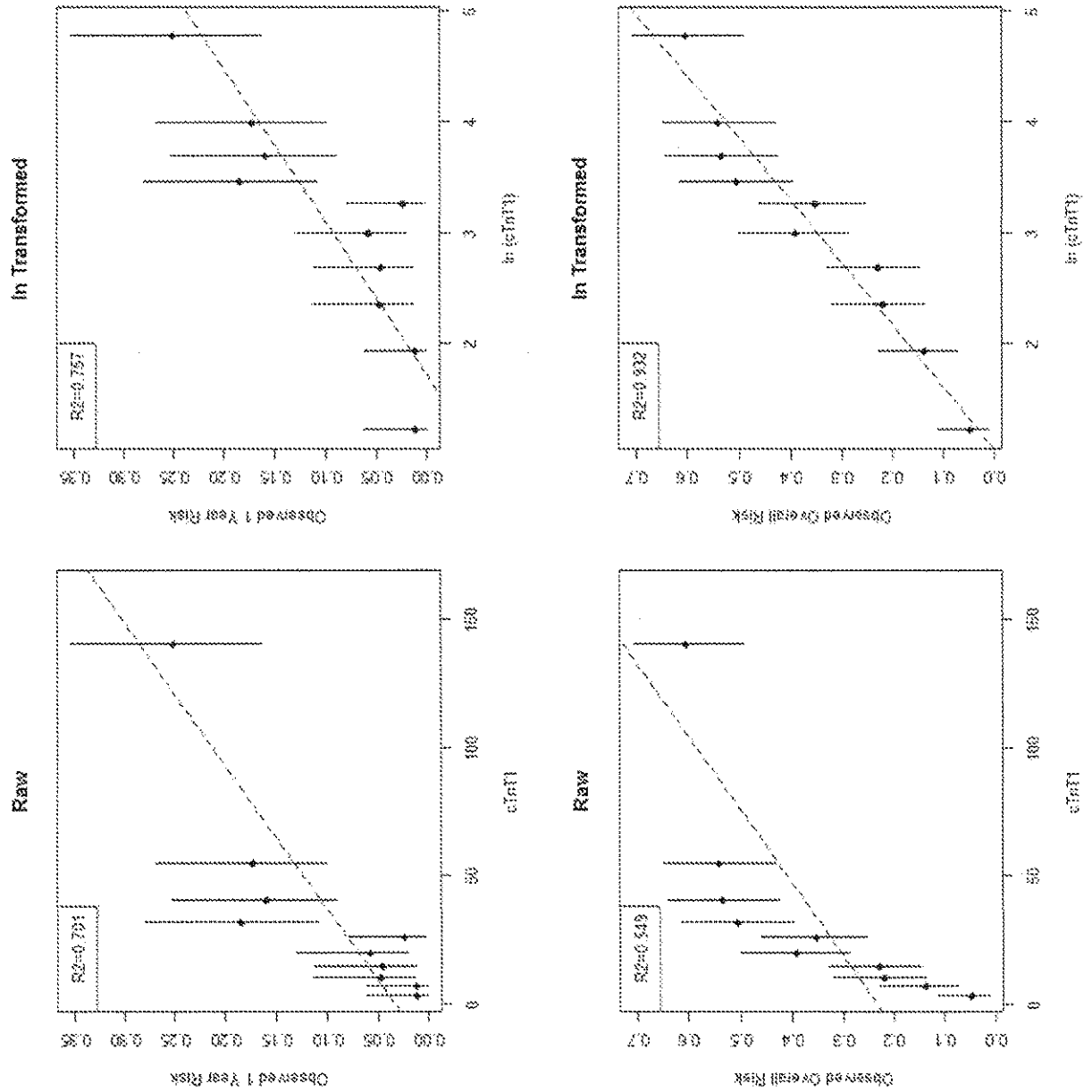


Fig. 6 Cut-Point Evaluation Troponin

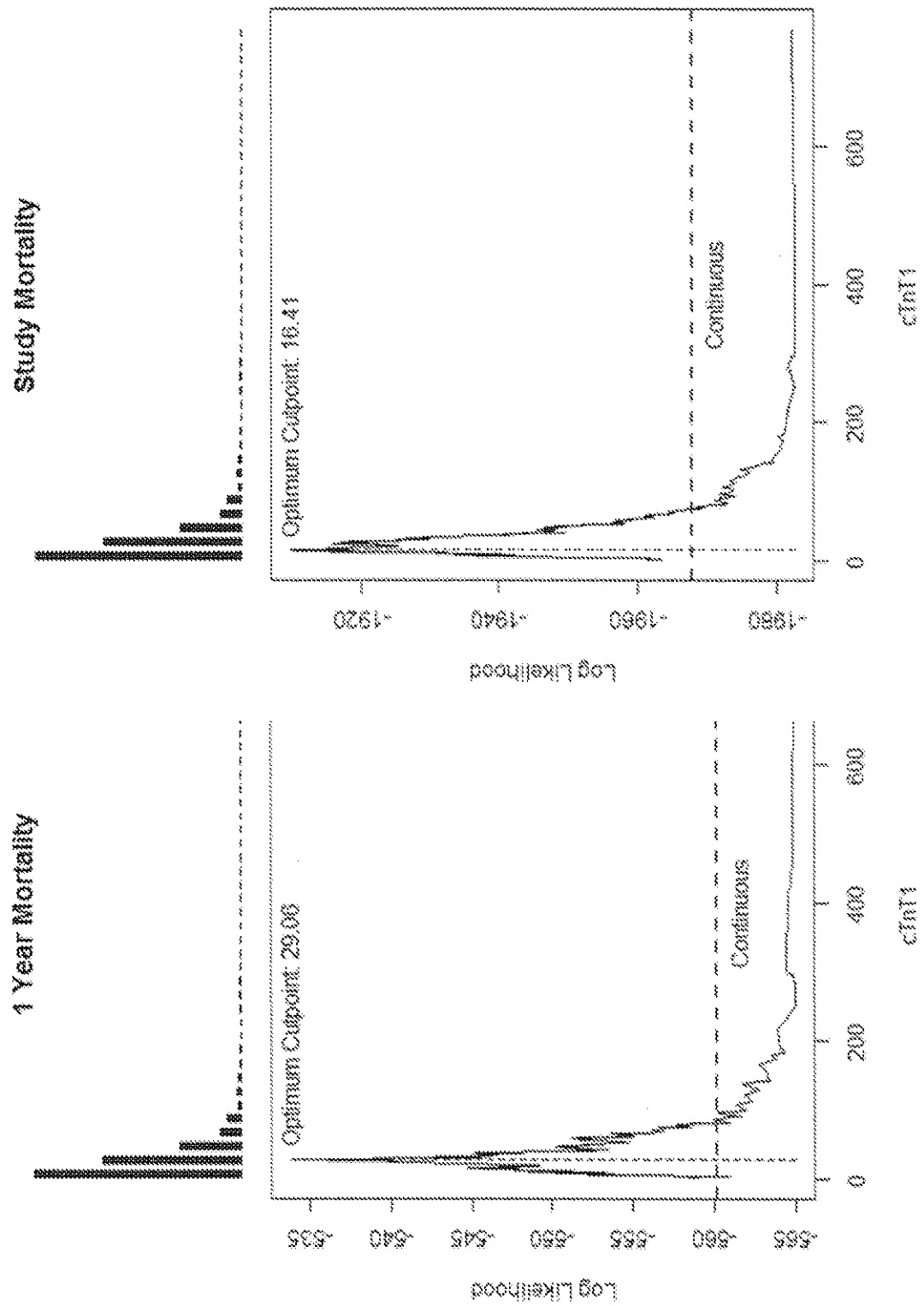


Fig. 7 Linearity Check: Creatinine

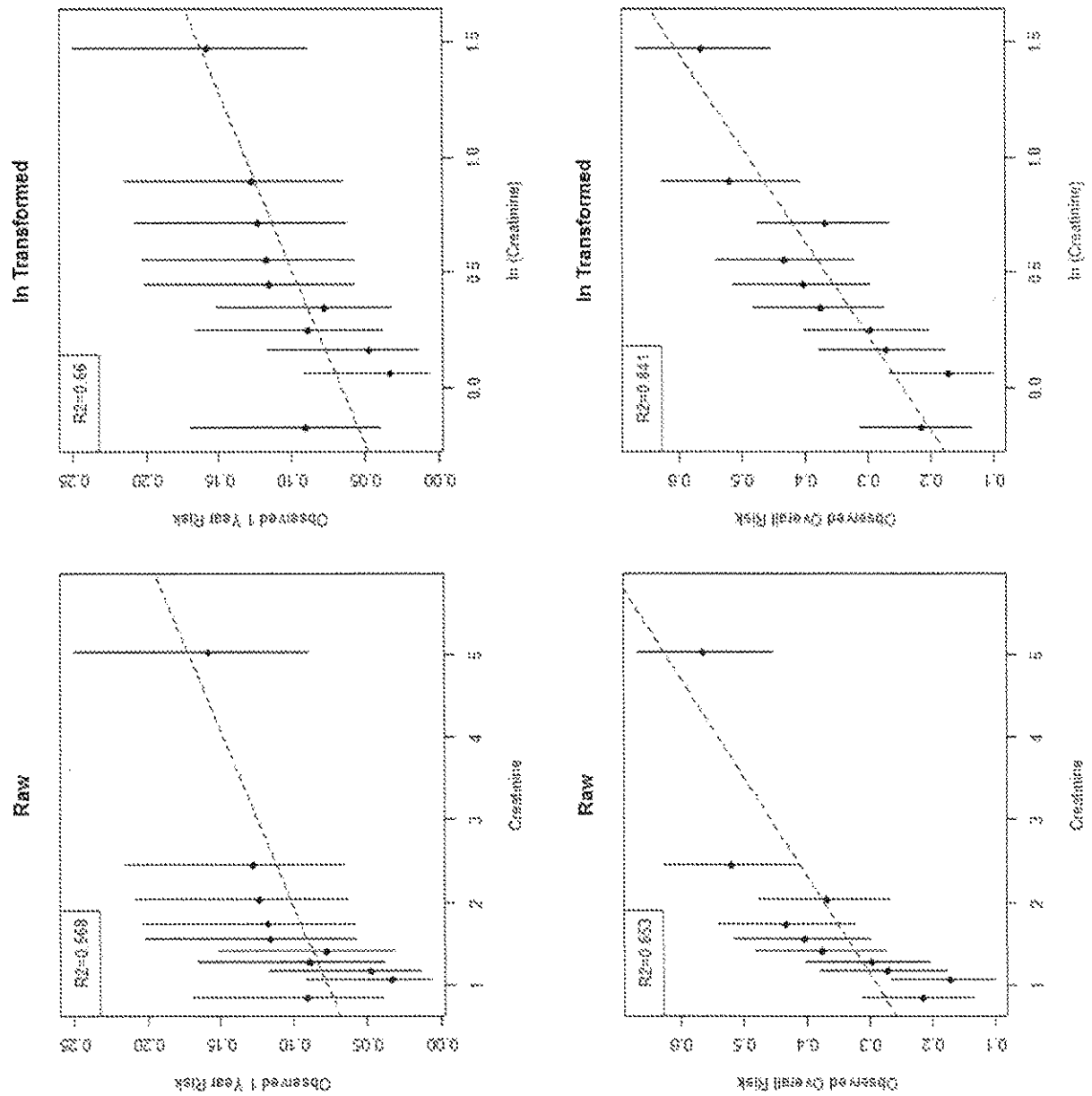


Fig. 8 Cut-Point Evaluation Creatinine

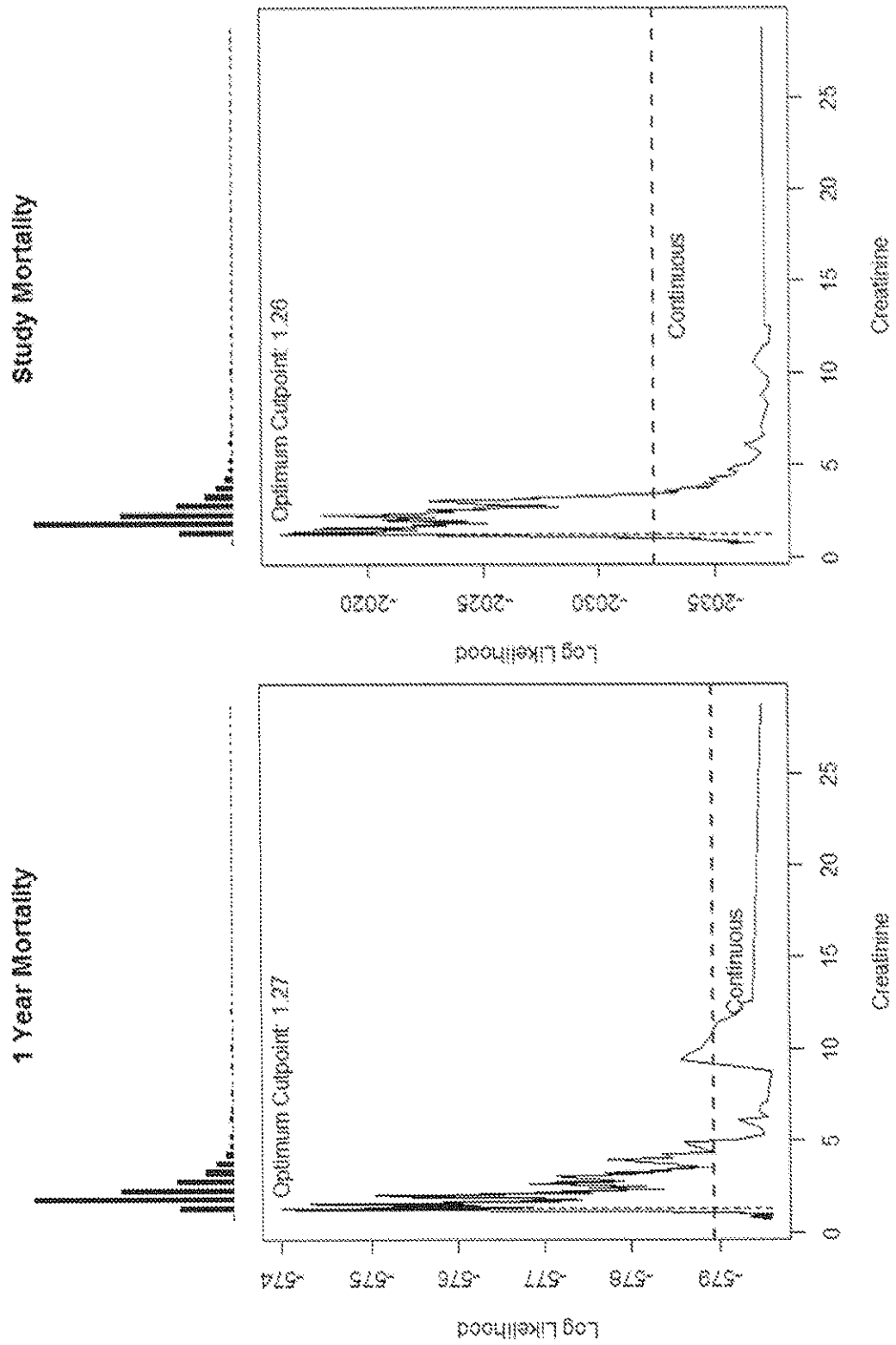


Fig. 9 Linearity Check: eGFR

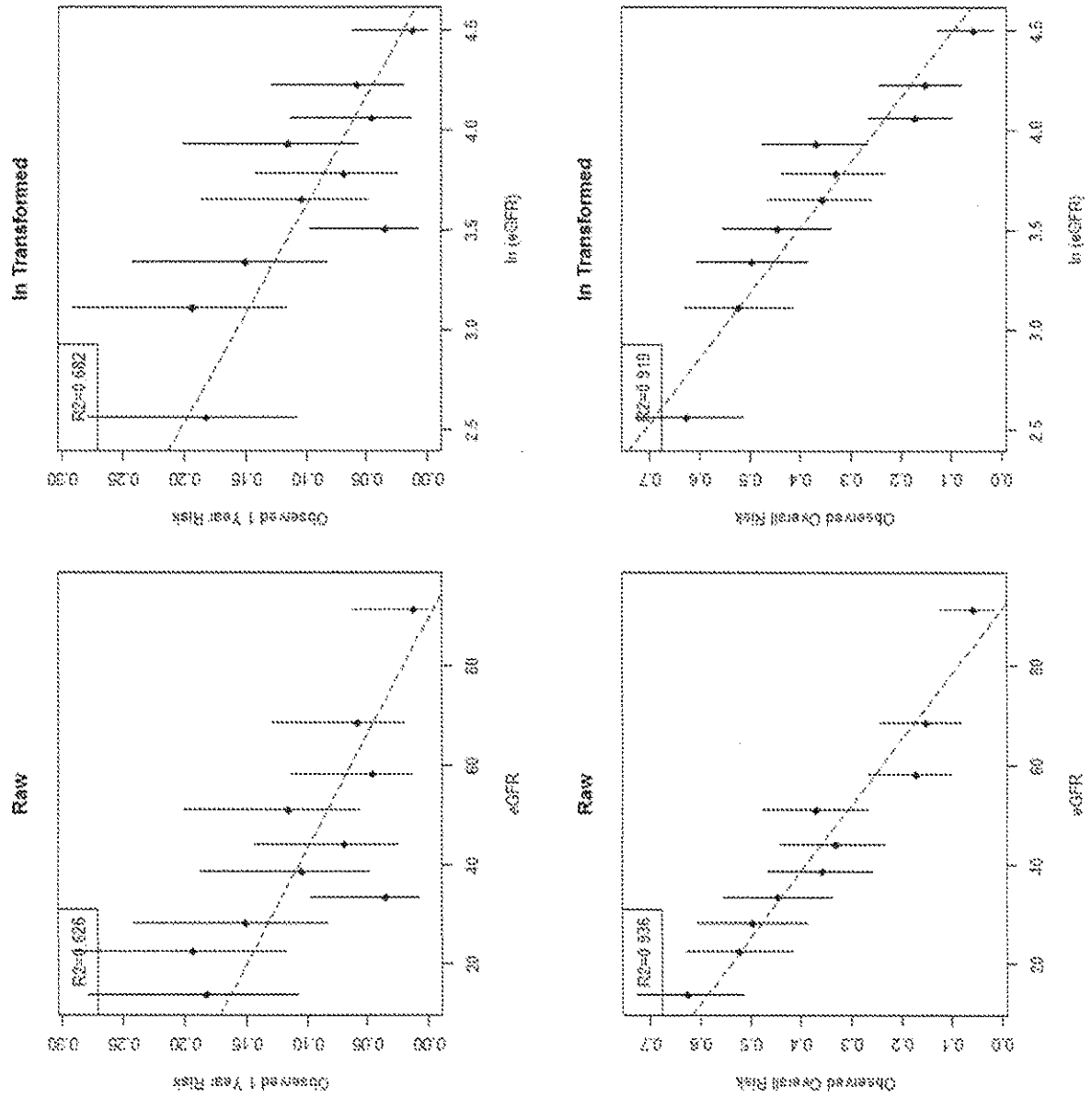


Fig. 10 Cut-Point Evaluation eGFR

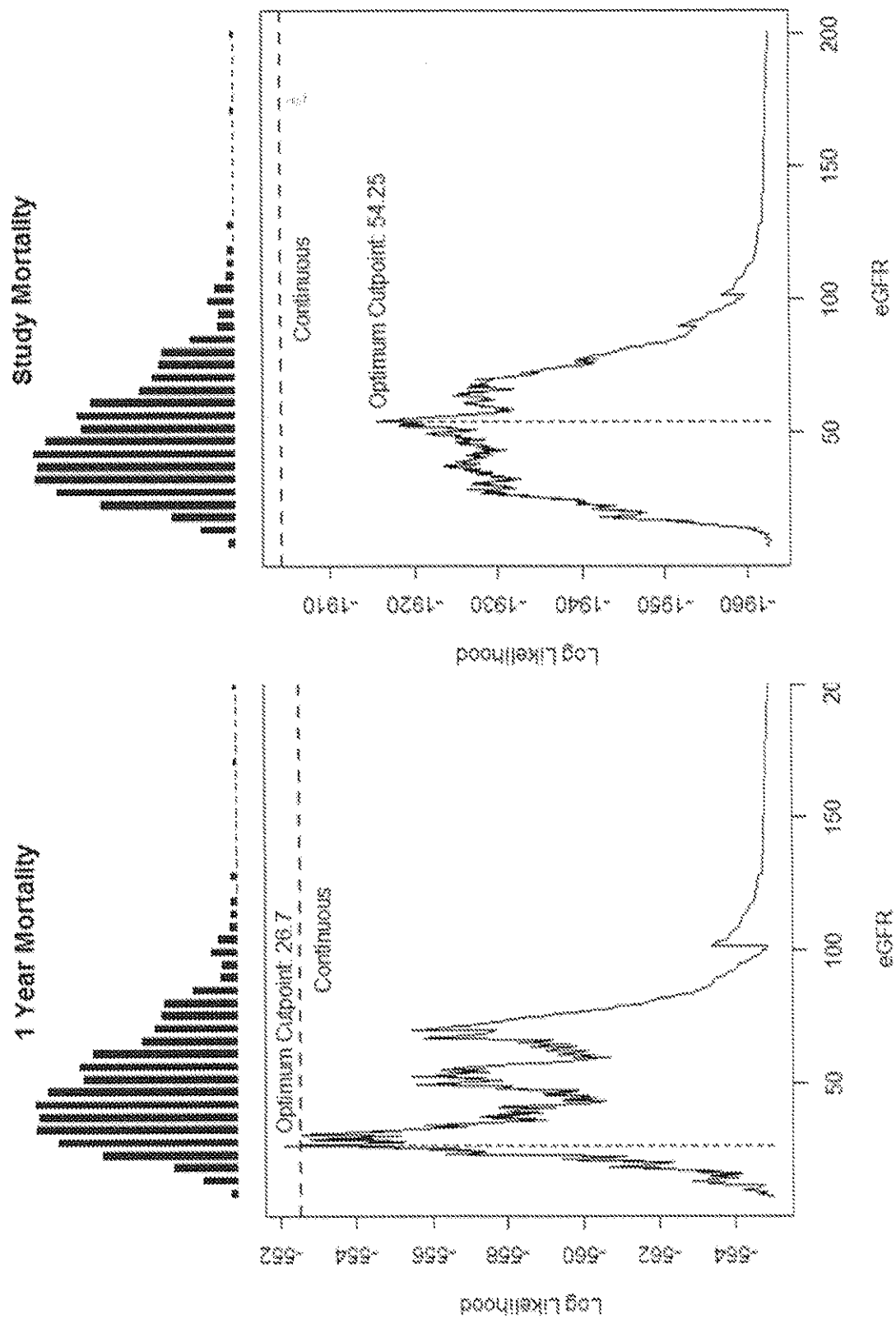


Fig. 11 Linearity Check: SBP

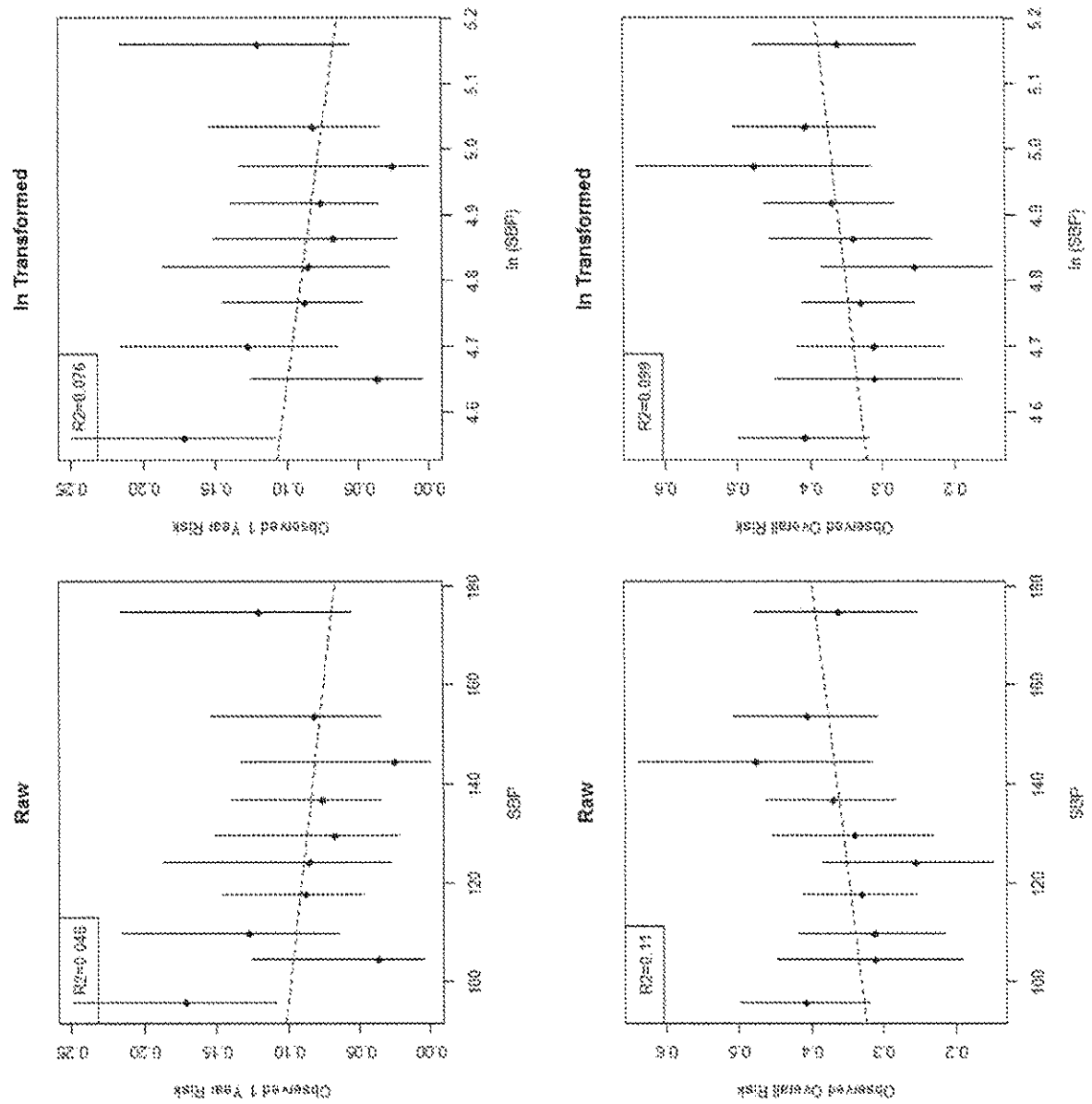


Fig. 12 Cut-Point Evaluation SBP

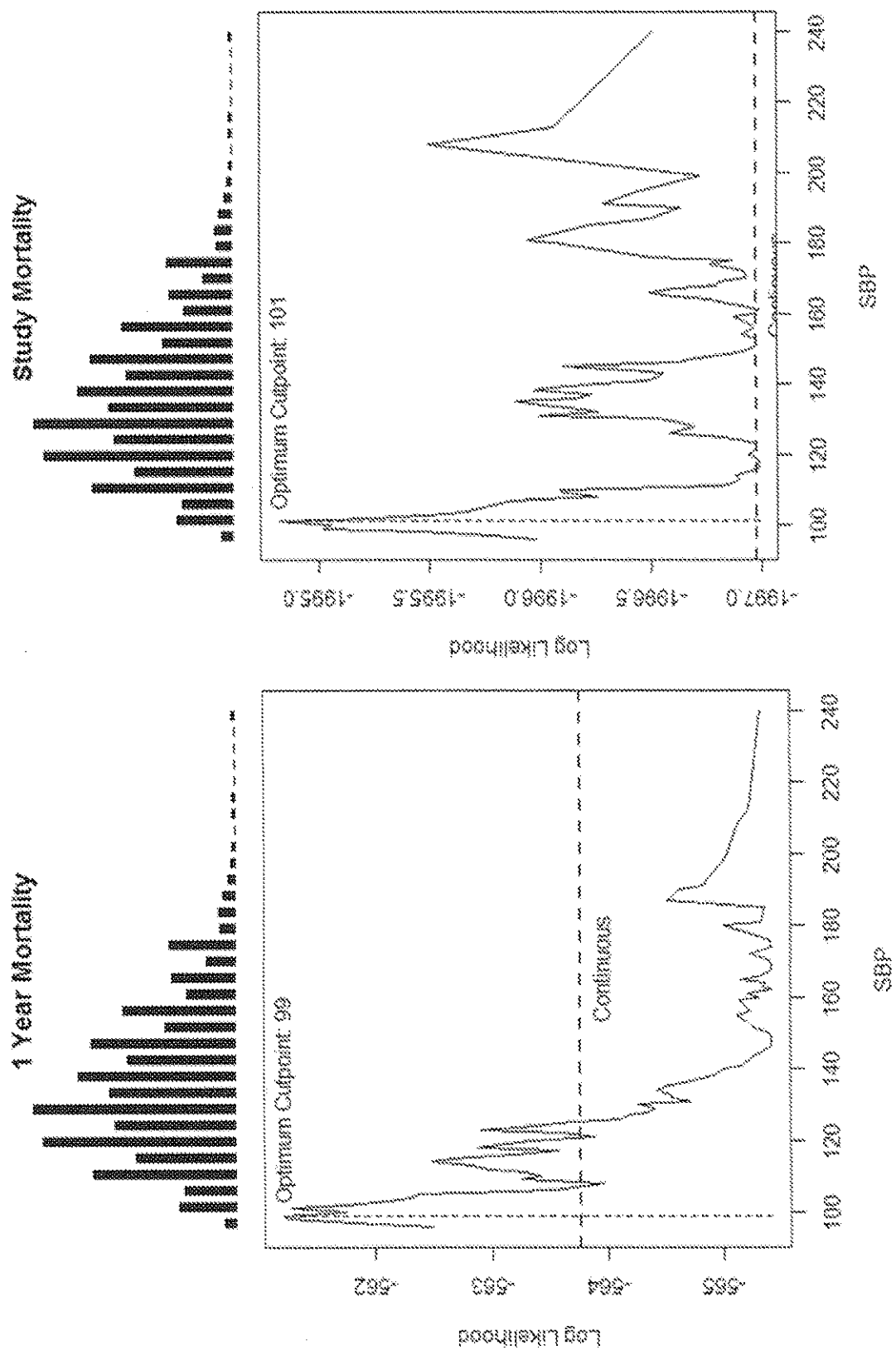


Fig. 13 Linearity Check: DBP

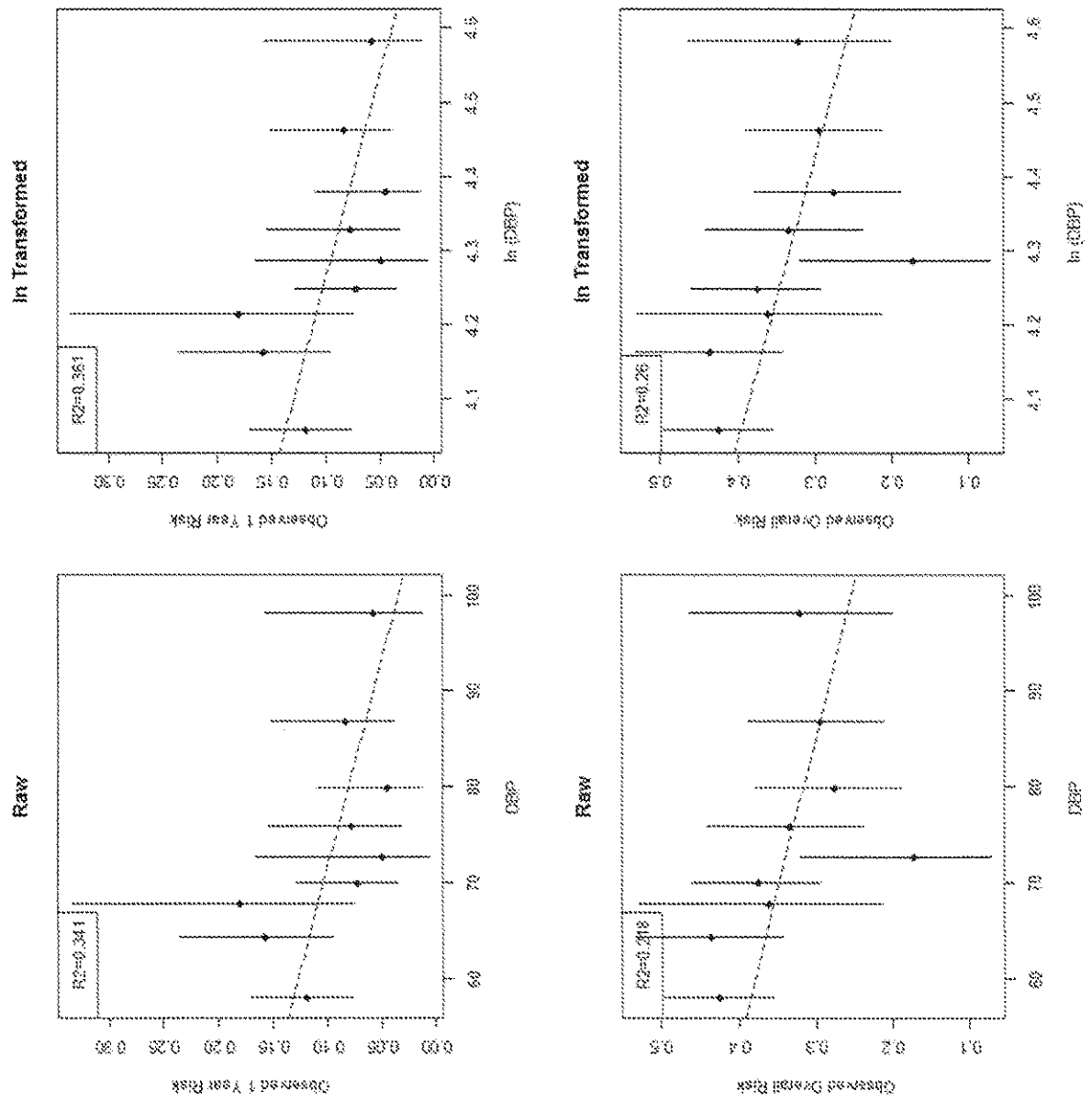


Fig. 14 Cut-Point Evaluation DBP

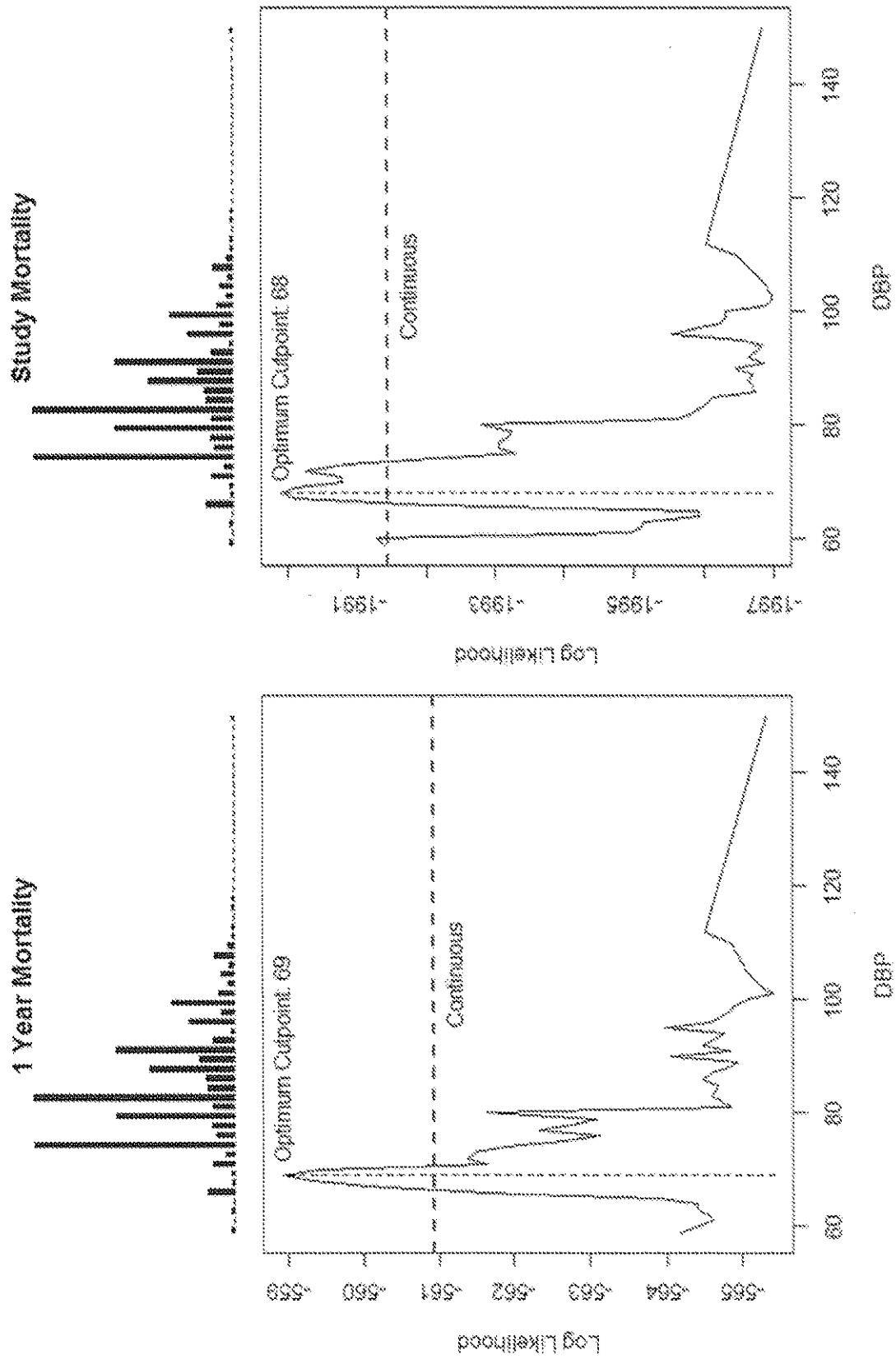


Fig. 15 Linearity Check: Hgb

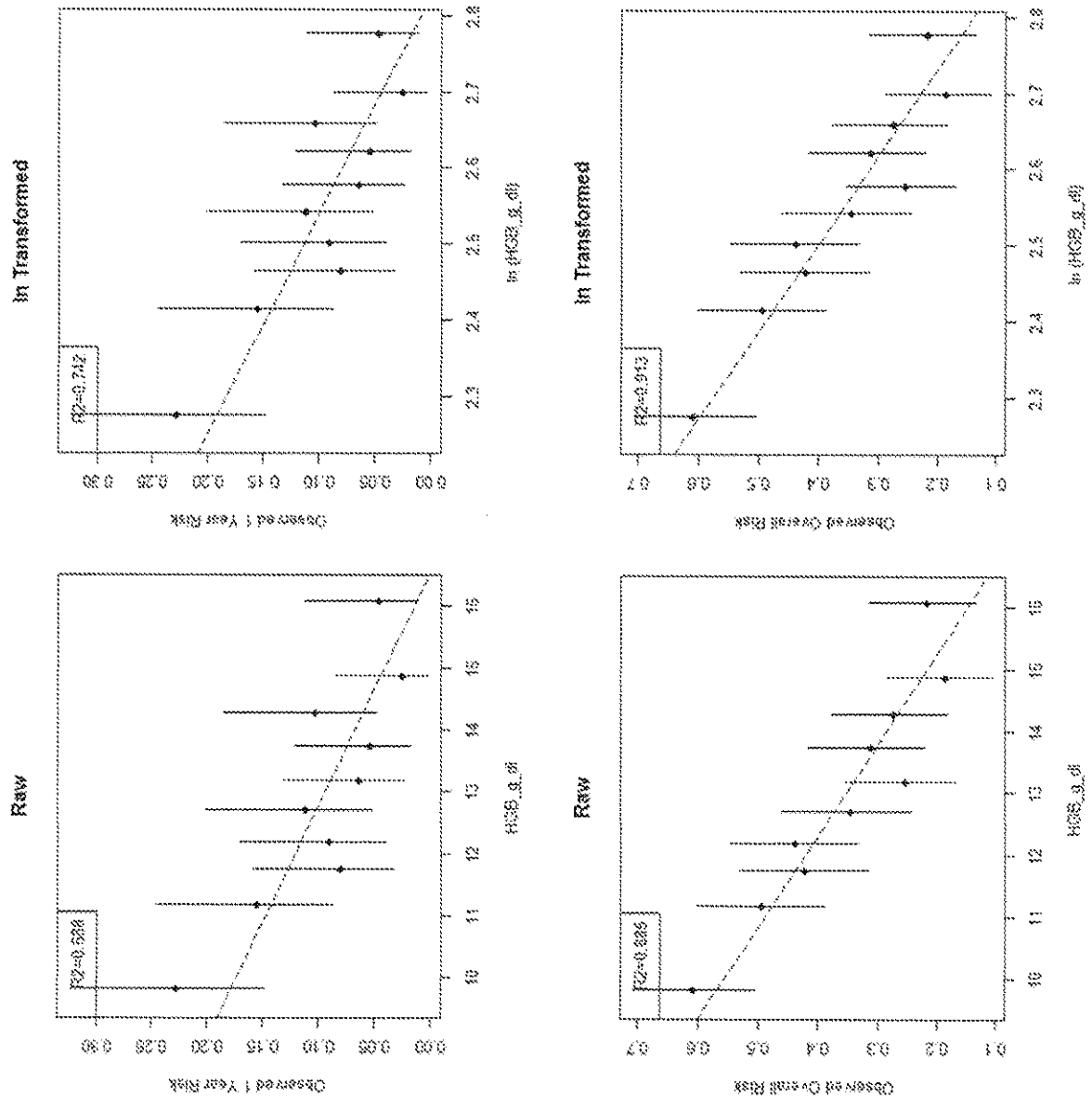


Fig. 16 Cut-Point Evaluation Hgb

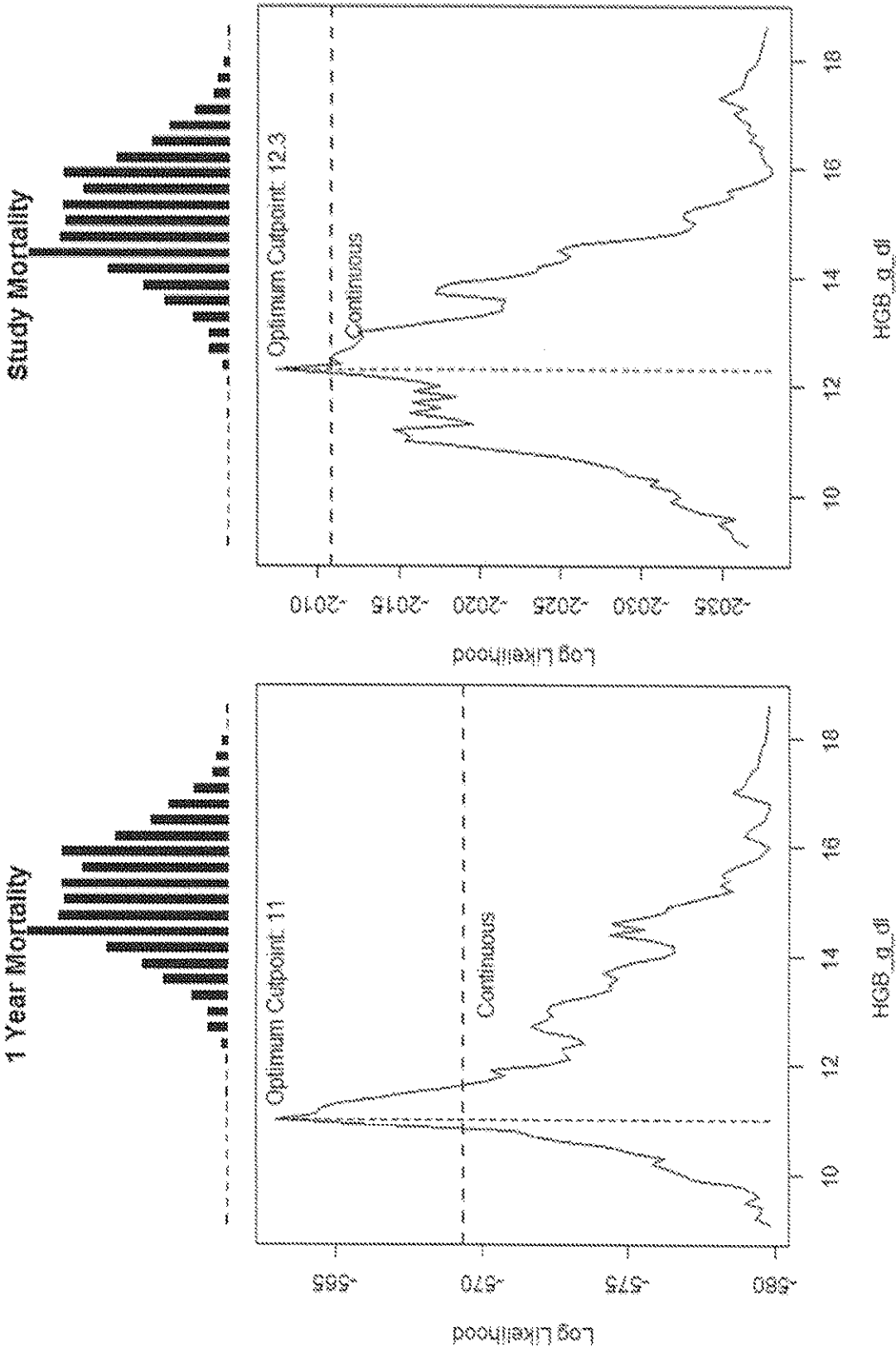


Fig. 17 Linearity Check: Age

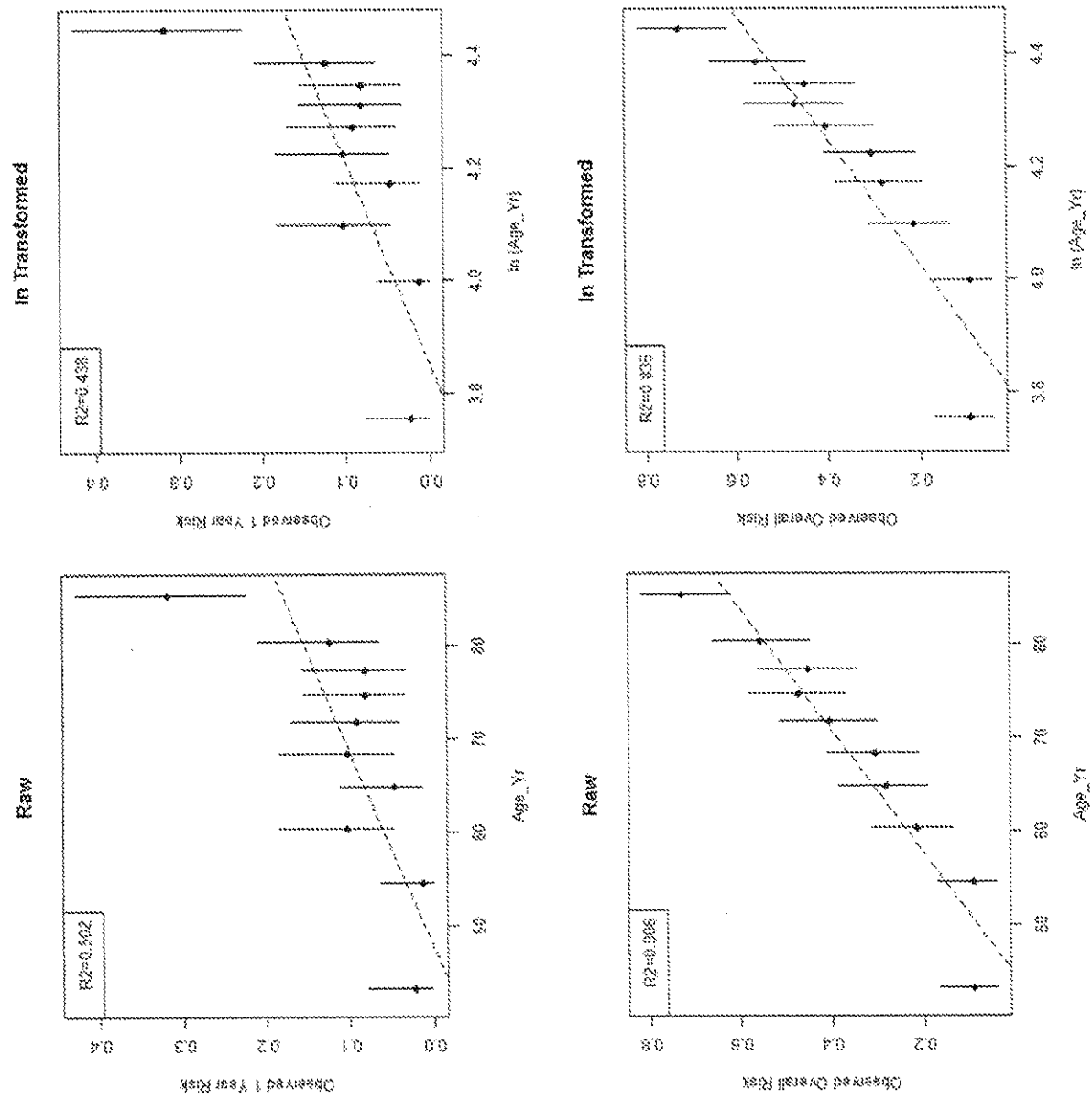


Fig. 18 Cut-Point Evaluation Age

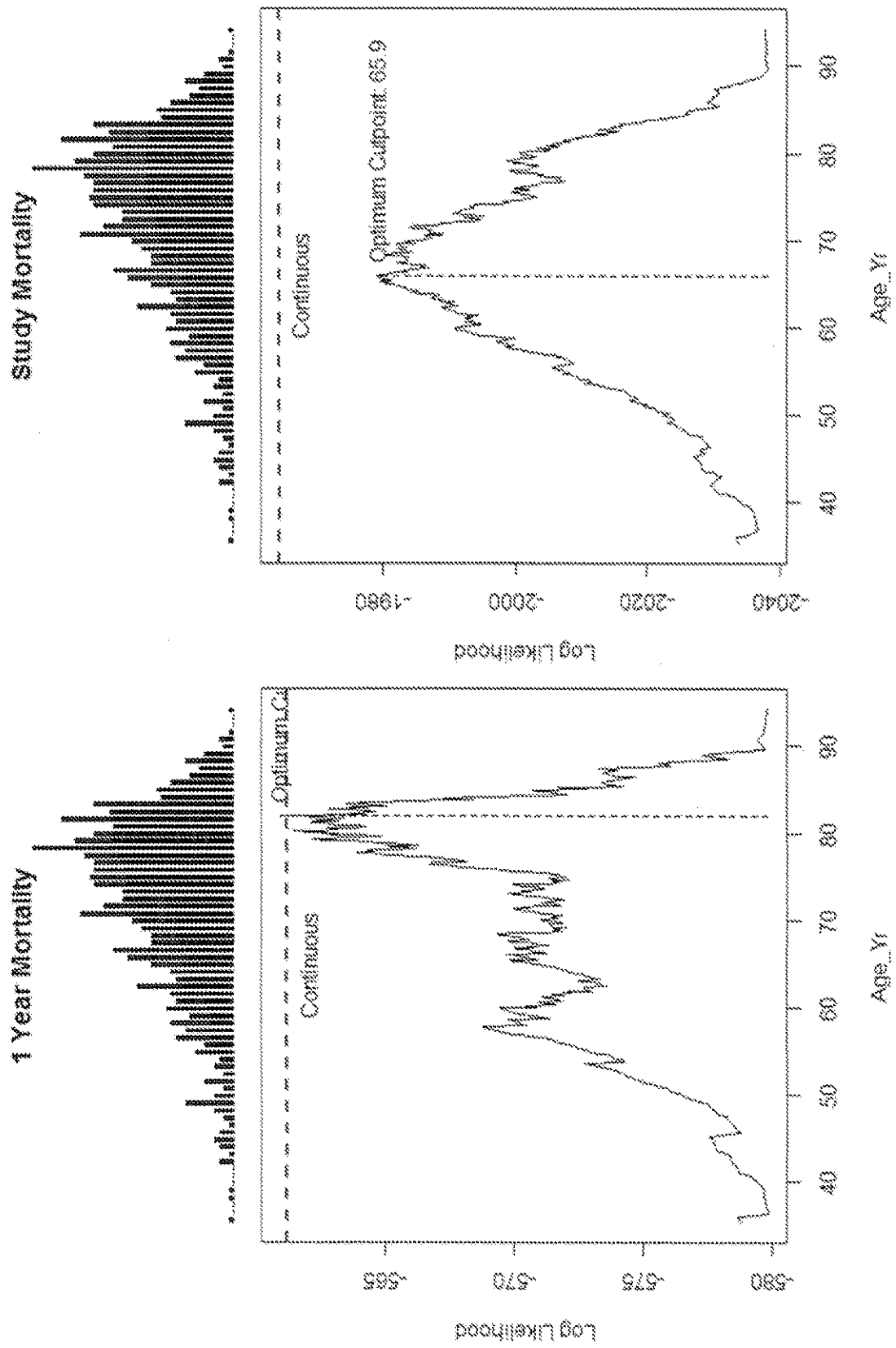


Fig. 19 Linearity Check: ST2

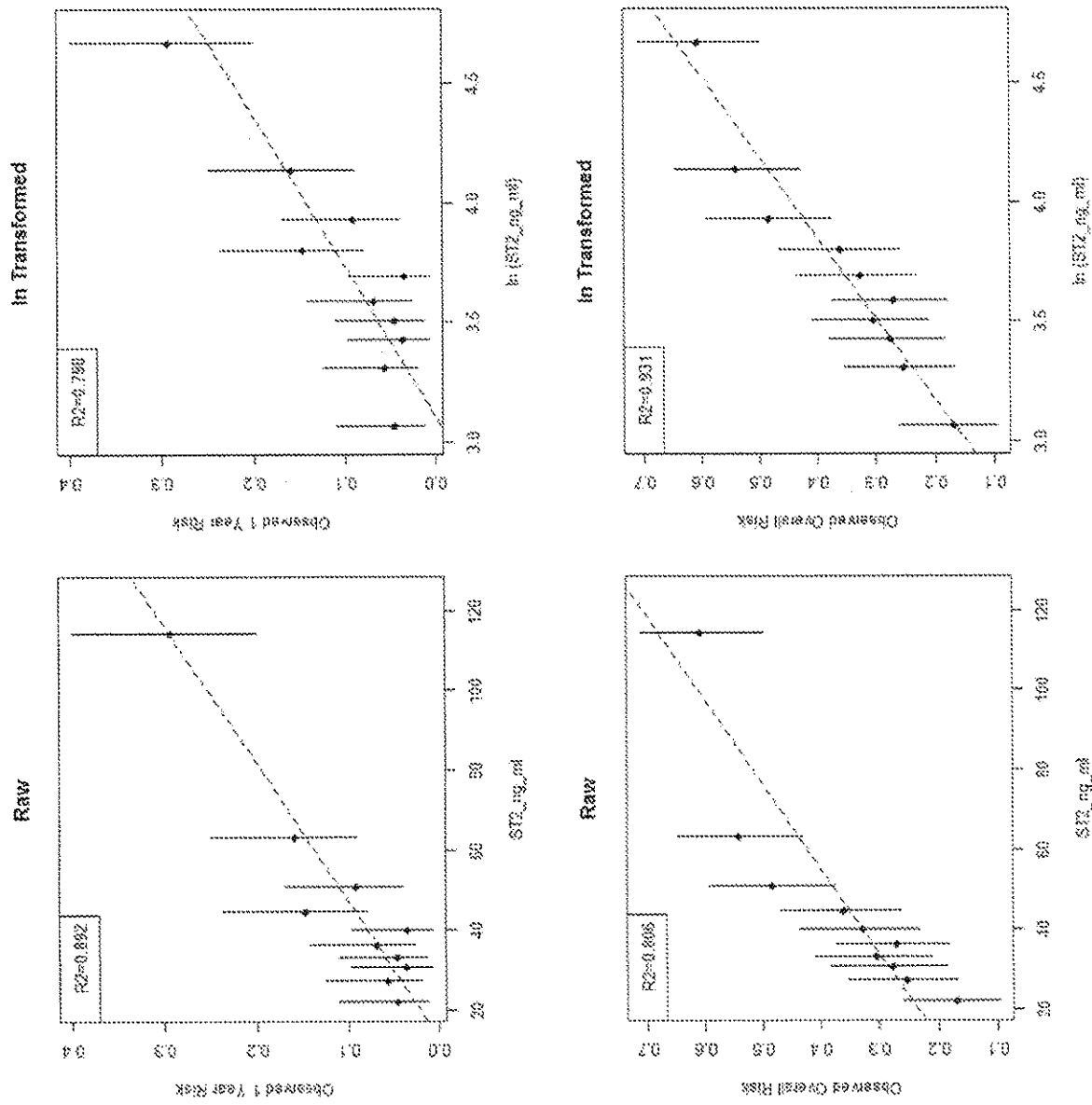


Fig. 20 Cut-Point Evaluation ST2

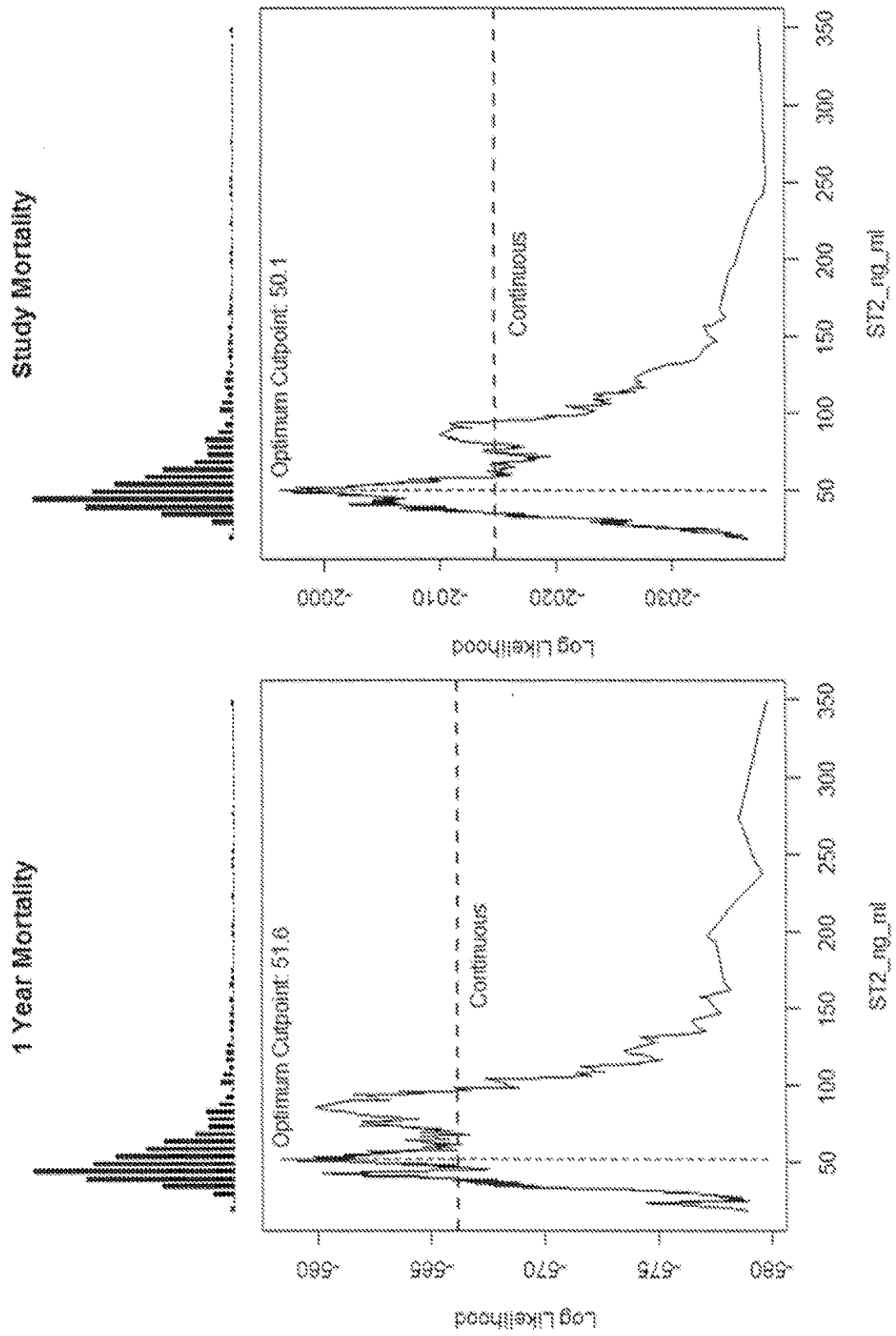


Fig. 21 Linearity Check: LVEF

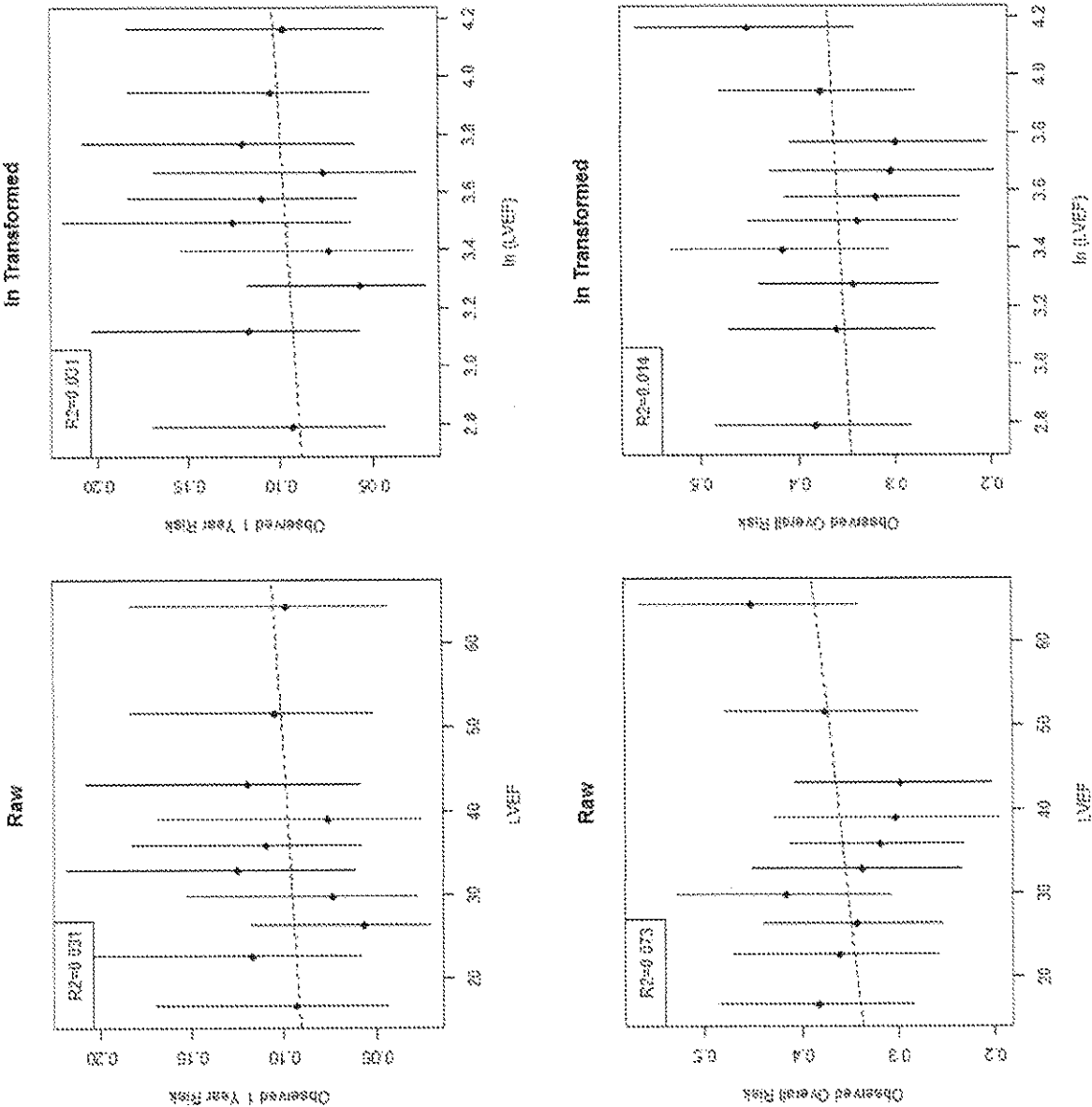


Fig. 22 Cut-Point Evaluation LVEF

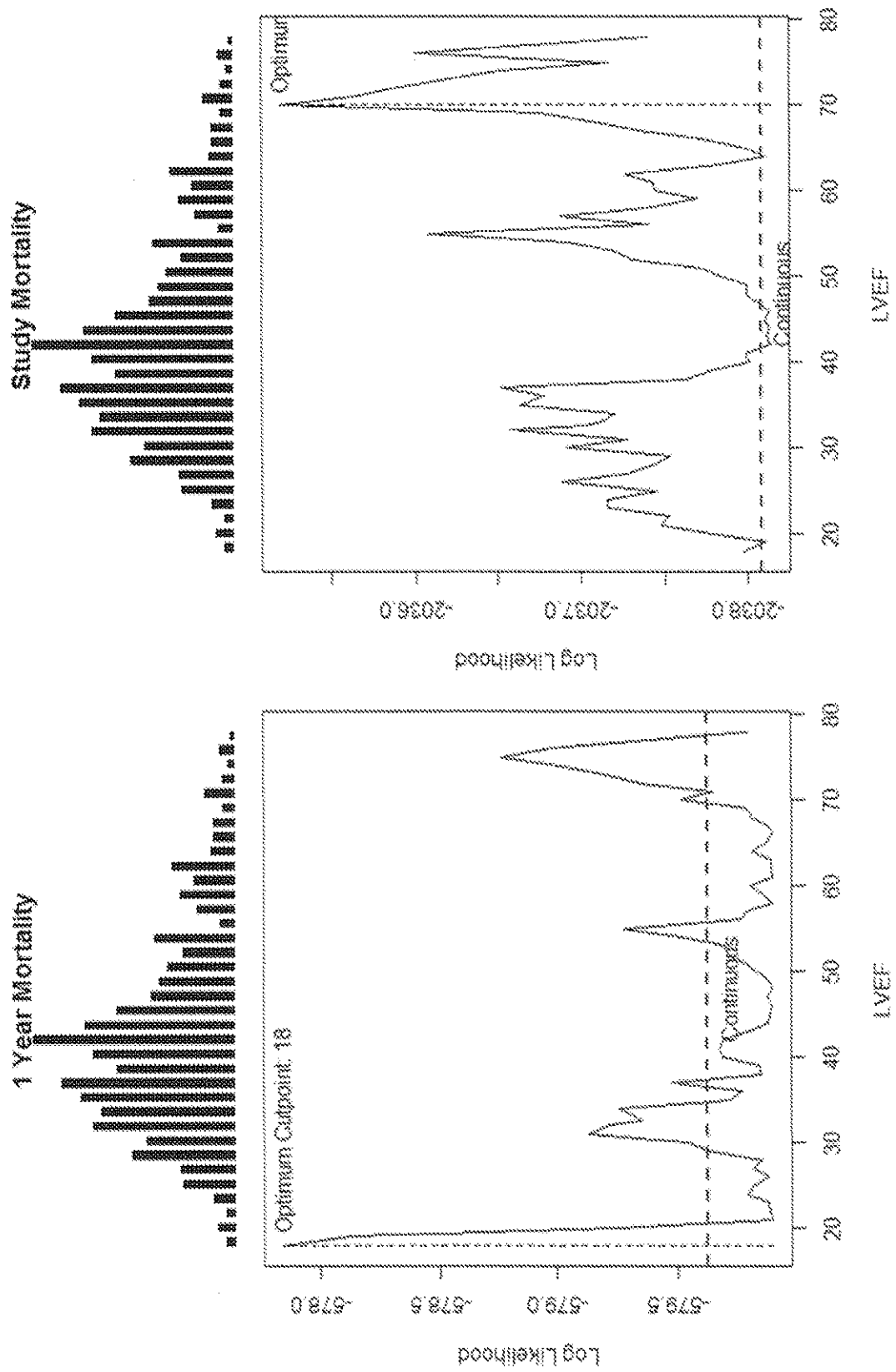


Fig. 23 Linearity Check: BMI

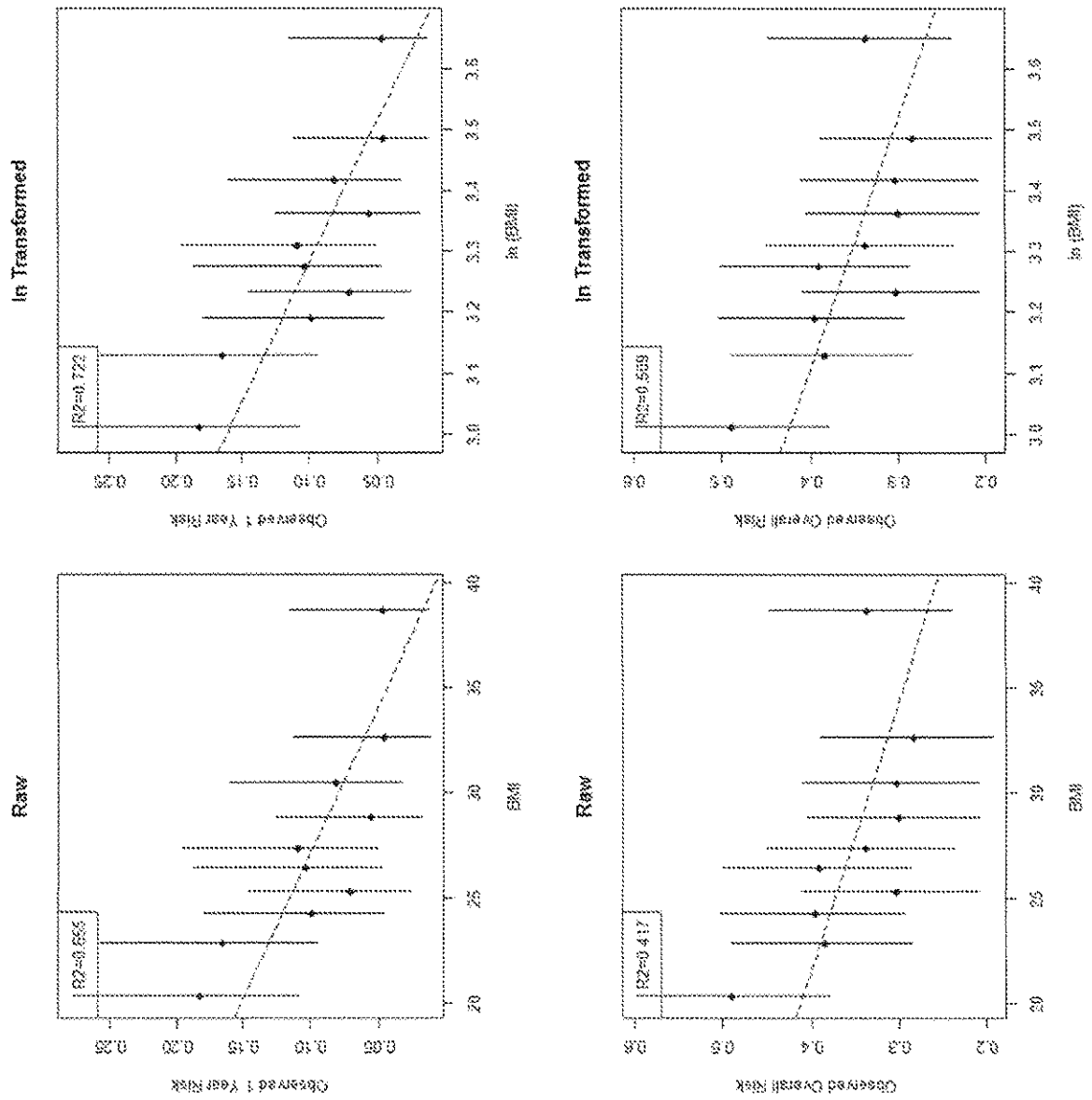


Fig. 24 Cut-Point Evaluation BMI

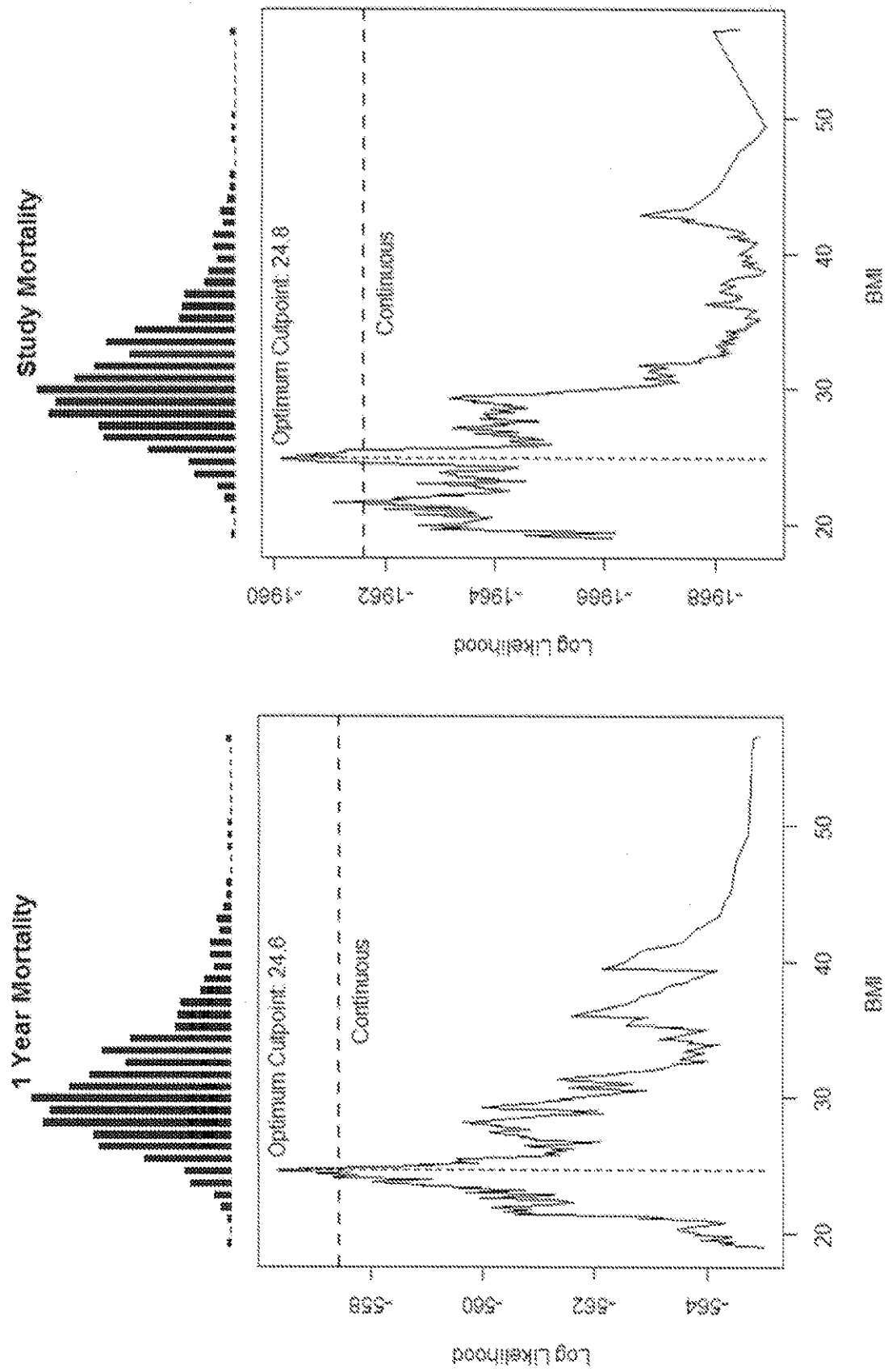


Fig. 25 Summary of Results

Variables	1-Yr Cut	Study-Cut	Selected Cut	Transformed	Comments
NTproBNP_pg_ml	1675	1836	1700	Yes	
cTnT1	29.06	16.41	16	Yes	Consistent with cutpoint identified
Creatinine	1.27	1.26	None	Yes	Not enough observations ion the low group
eGFR	26.7	54.25	50	Yes	Moderate decrease in GFR
SBP	99	101	120	No	Selected for historical comparison
DBP	69	68	None	No	Not enough observations ion the low group
HGB_g_dl	11	12.3	None	Yes	Not enough observations ion the low group
Age_Yr	82	65.9	None	No	Not nearly as good as continuous
ST2_ng_ml	51.6	50.1	35 / 50	Yes	Try two different Cuts
LVEF	18	70	None	No	Not enough observations ion the low group
BMI	24.6	24.8	25	No	Overweight cutoff

Fig. 26 Summary of Variables

- Continuous
 - Ln NT-proBNP
 - LN Troponin
 - LN Creatinine
 - LN eGFR
 - SBP
 - DBP
 - LN Hgb
 - Age
 - LN ST2
 - LVEF
 - BMI
- Discrete
 - NT-proBNP $\geq$ 1700
 - Troponin $\geq$ 16
 - eGFR $<$ 50
 - SBP $<$ 120
 - ST2 $\geq$ 35
 - ST2 $\geq$ 50
 - ST2 3 Groups
 - BMI $\geq$ 25
 - NYHA $\geq$ 3
 - Sex
 - CAD
 - Diabetes
 - Hypertension

Fig. 27 Top 10 Models
1 Year Outcomes (Size =1-5)

Model No K	Standardized Hazard Ratios							Model Fit				Discrimination			
	Age Yr	lnST2	ST2ge50	ST2	Troponin InTroponin ge1	NYHAge3 SBPtt120 CAD	BMI BMIge25	InNTpro InCreat InHGB Diabetes	logLik	AIC	BIC	AUC	bsAUC	LCI	UCI
13488 5	1.66	1.48			1.53	1.29	0.85		-532.0	1074.1	1098.0	0.802	0.795	0.734	0.855
16905 5	1.74	1.45			1.45	1.29	1.18		-532.0	1074.1	1098.0	0.804	0.794	0.738	0.850
11944 5	1.76	1.50			1.51			1.18	-534.0	1077.9	1101.9	0.801	0.792	0.731	0.854
16189 5	1.69	1.47			1.50	1.30		0.99	-533.2	1076.4	1100.3	0.800	0.792	0.728	0.856
16825 5	1.61	1.42			1.46	1.36		1.16	-533.8	1077.7	1101.6	0.795	0.792	0.725	0.859
13506 5	1.64	1.54			1.64	1.32	0.87		-533.3	1076.6	1100.6	0.799	0.792	0.713	0.871
3524 4	1.65			1.57	1.57	1.34			-534.0	1076.0	1095.2	0.796	0.790	0.734	0.846
16987 5	1.68	1.43			1.53	1.35	1.19		-533.1	1076.2	1100.1	0.798	0.789	0.732	0.847
11372 5	1.62	1.45			1.43	1.32			-531.3	1072.6	1096.5	0.804	0.789	0.715	0.863
16650 5	1.84	1.48			1.46	1.22	0.78	0.78	-532.1	1074.2	1098.2	0.797	0.789	0.723	0.855

Markers Not Selected:

Ln (eGFR)

SBP

DBP

LVEF

NT-proBNP>=1700

GFR<50

ST2 >= 35

Sex

Hypertension

Fig. 28 Top 10 3 Parameter Models
1 Year Outcome

		Standardized Hazard Ratios					Model Fit			Discrimination							
		ST2 lnST2	ST2gte50	Age_Yr	Troponin lnTroponin	TROPONINGte16	NYHAgte3	NTBNPgte1700	BMI	BMIgte25	logLik	AIC	BIC	AUC	bsAUC	LCI	UCI
Model No	K																
476	3	1.62		1.81				1.47			-538.6	1083.2	1097.6	0.781	0.780	0.716	0.844
477	3	1.62		1.84							-538.6	1083.1	1097.5	0.789	0.779	0.725	0.832
481	3	1.60		1.78			1.38				-538.1	1082.3	1096.6	0.786	0.778	0.706	0.849
474	3	1.53		1.80	1.57	1.70					-536.6	1079.2	1093.6	0.789	0.777	0.710	0.844
320	3	1.69		1.91					0.80		-541.1	1088.3	1102.6	0.782	0.776	0.714	0.838
1933	3	1.52			1.51			1.39			-542.6	1091.2	1105.6	0.773	0.775	0.709	0.841
1934	3	1.48			1.59		1.39				-540.4	1086.8	1101.2	0.783	0.774	0.705	0.844
299	3	1.68		1.88			1.45		0.74		-540.9	1087.9	1102.3	0.778	0.773	0.700	0.847
1978	3		1.49		1.67						-540.8	1087.5	1101.9	0.779	0.773	0.708	0.838
490	3		1.46	1.76	1.69						-539.2	1084.4	1098.8	0.782	0.771	0.693	0.850

Markers Not Selected:

Ln (NT-proBNP)

Ln Creatinine

Ln (eGFR)

SBP

DBP

Ln (Hgb)

LVEF

GFR<50

SBP<120

ST2 >= 35

ST2 3 Groups

Fig. 29 Selected Models Based on AIC

1 Year Outcome			
Fitted AUC:0.821			
bsAUC: 0.751 [0.677-0.824]			
Backward Selection			
	HR	95% CI	P
ln (Troponin)	1.34	1.01-1.78	0.0423
ln (Creatinine)	0.08	0.02-0.26	<0.0001
ln (eGFR)	0.09	0.03-0.28	<0.0001
ln (Hgb)	0.28	0.07-1.03	0.056
ln (ST2)	2.05	1.37-3.08	0.0005
LVEF	1.02	1-1.04	0.028
NTproBNP>=1700	1.53	0.87-2.66	0.1377
SBP<120	1.55	0.98-2.44	0.06
NYHA>=3	1.67	1.06-2.64	0.028
Sex	3.76	1.95-7.26	<0.0001
Diabetes	1.44	0.92-2.25	0.11
Fitted AUC:0.818			
bsAUC: 0.751 [0.677-0.824]			
Stepwise Selection			
	HR	95% CI	P
ln (Troponin)	1.43	1.11-1.84	0.0053
ln (ST2)	2.26	1.51-3.38	<0.0001
Age	1.05	1.02-1.07	0.0002
NYHA>=3	1.69	1.07-2.65	0.0239
ln (HGB)	0.27	0.07-1.02	0.0535
BMI>=25	0.63	0.41-0.98	0.0408
SBP<120	1.46	0.93-2.28	0.0977
Diabetes	1.6	1.01-2.53	0.047
CAD	0.68	0.44-1.06	0.0855
Hypertension	0.67	0.41-1.07	0.0942
Fitted AUC:0.818			
bsAUC: 0.751 [0.677-0.825]			
Forward Selection			
	HR	95% CI	P
ln (Troponin)	1.43	1.11-1.84	0.0053
ln (ST2)	2.26	1.51-3.38	<0.0001
Age	1.05	1.02-1.07	0.0002
NYHA>=3	1.69	1.07-2.65	0.0239
ln (HGB)	0.27	0.07-1.02	0.0535
BMI>=25	0.63	0.41-0.98	0.0408
SBP<120	1.46	0.93-2.28	0.0977
Diabetes	1.6	1.01-2.53	0.047
CAD	0.68	0.44-1.06	0.0855
Hypertension	0.67	0.41-1.07	0.0942

Fig. 30 Selected Models Based on BIC
1 Year Outcome

Fitted AUC:0.818 bsAUC: 0.796 [0.756-0.836]				Fitted AUC:0.817 bsAUC: 0.797 [0.757-0.837]			
Backward Selection				Stepwise Selection			
	HR	95% CI	P		HR	95% CI	P
ln (Troponin)	1.45	1.12-1.88	0.0043	ln (Troponin)	1.49	1.18-1.89	0.0008
ln (Creatinine)	0.09	0.03-0.29	<0.0001	ln (ST2)	2.34	1.59-3.47	<0.0001
ln (eGFR)	0.09	0.03-0.27	<0.0001	Age	1.04	1.02-1.07	0.0004
ln (ST2)	2.23	1.48-3.35	0.0001	NYHA>=3	1.82	1.16-2.85	0.0091
NYHA>=3	1.86	1.18-2.92	0.0074				
Sex	3	1.62-5.57	0.0005				
Fitted AUC:0.817 bsAUC: 0.798 [0.758-0.837]				Forward Selection			
	HR	95% CI	P		HR	95% CI	P
ln (Troponin)	1.49	1.18-1.89	0.0008	ln (Troponin)	1.49	1.18-1.89	0.0008
ln (ST2)	2.34	1.59-3.47	<0.0001	ln (ST2)	2.34	1.59-3.47	<0.0001
Age	1.04	1.02-1.07	0.0004	Age	1.04	1.02-1.07	0.0004
NYHA>=3	1.82	1.16-2.85	0.0091	NYHA>=3	1.82	1.16-2.85	0.0091

Fig. 31 Top 10 Models
Study Outcomes (Size =1-5)

Model No	K	Tropoin					Model Fit				Discrimition								
		Age_Yr	ST2gte50	NYHAgte3	TROPONINgte16	InTropoin	IneGFR	InHGB	InCreat	SBP	CAD	HTN	logLik	AIC	BIC	AUC	bsAUC	LCI	UCI
16776	5	1.67	1.39	1.34	1.65	1.65		0.84					-1881.2	3772.3	3796.3	0.818	0.817	0.782	0.853
16581	5	1.60	1.37	1.35	1.65		0.89						-1884.6	3779.2	3803.2	0.817	0.817	0.775	0.859
16692	5	1.71	1.36	1.30	1.54	1.54		0.85					-1882.5	3775.1	3799.0	0.818	0.816	0.773	0.858
17095	5	1.69	1.38	1.35	1.70				0.98				-1886.1	3782.2	3806.1	0.815	0.815	0.777	0.853
13616	5	1.68	1.38	1.36	1.70					1.01			-1886.1	3782.3	3806.2	0.816	0.815	0.776	0.853
16317	5	1.68	1.37	1.36	1.64				1.13				-1884.2	3778.3	3802.3	0.817	0.815	0.777	0.852
3526	4	1.72	1.36	1.33	1.59	1.59							-1887.2	3782.5	3801.6	0.815	0.814	0.774	0.854
3610	4	1.68	1.38	1.36	1.70								-1886.2	3780.3	3799.5	0.815	0.814	0.777	0.851
16497	5	1.66	1.35	1.33	1.55	1.55	0.92						-1886.5	3783.0	3807.0	0.816	0.814	0.774	0.854
15971	5	1.70	1.38	1.36	1.71					0.94			-1885.6	3781.3	3805.3	0.817	0.813	0.773	0.853

Markers Not Selected: LVEF

Ln (NT-proBNP)

DBP

Ln (ST2)

SBP<120

ST2>=35

ST2 3 Group

BMI >=25

Sex

Diabetes

Model No K

Markers Not Selected:	SBP	BMI	ST2 >= 35	Diabetes
Ln (NT-proBNP)	DBP	NT-proBNP >=1700	BMI>=25	Hypertension
Ln Creatinine	Ln (Hgb)	GFR<50	SEX	
Ln (eGFR)	LVEF	SBP<120	CAD	

Markers Not Selected:

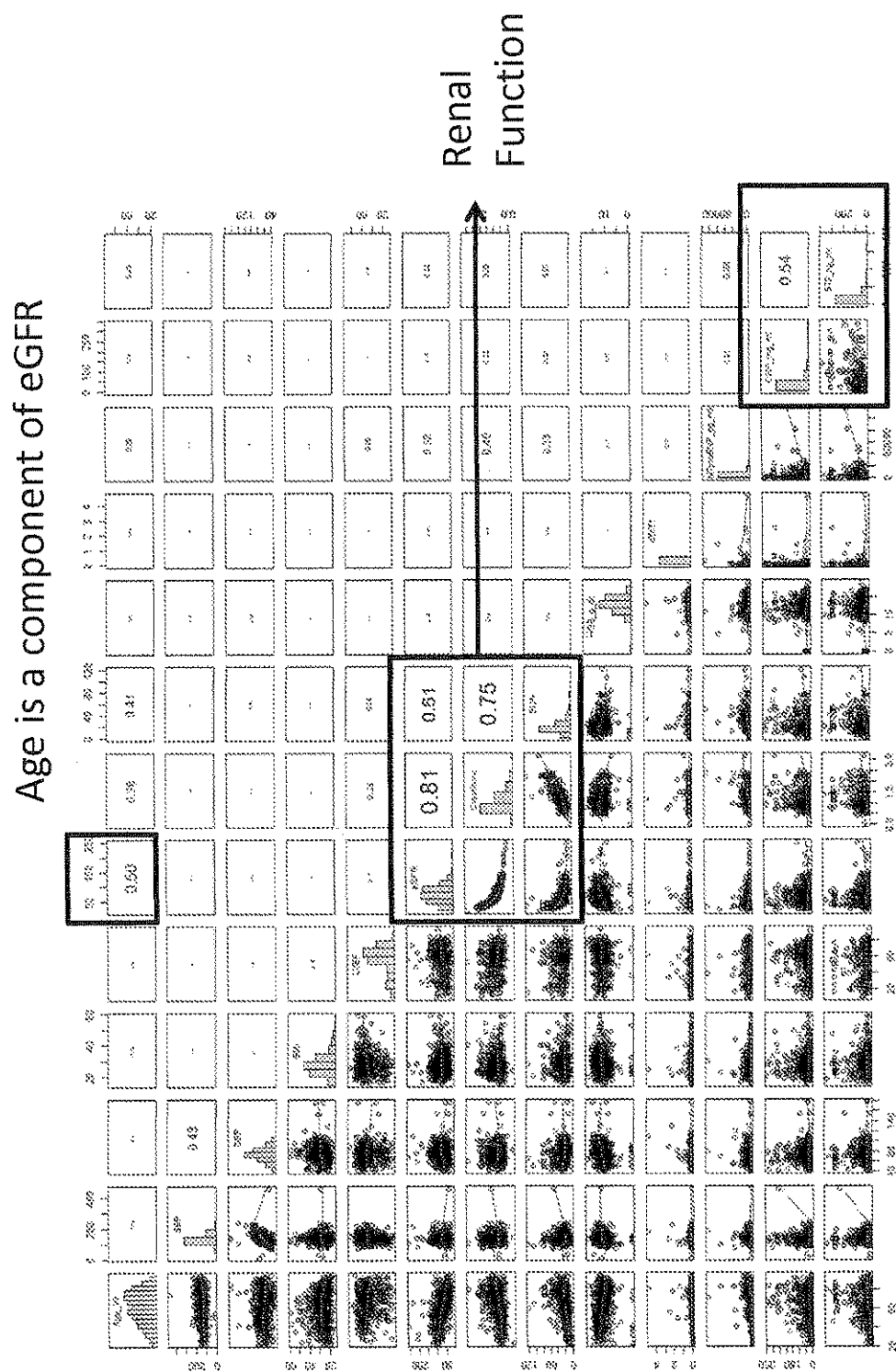
Fig. 33 Models Based on AIC
Study Outcome

Backward Selection				Stepwise Selection			
HR	95% CI	P		HR	95% CI	P	
In (NT-proBNP)	1.13	1.01-1.27	0.0407	In (Troponin)	1.2	1-1.45	0.0534
In (Troponin)	1.19	0.99-1.44	0.0695	Age	1.04	1.03-1.05	<0.0001
In (Creatinine)	1.69	0.91-3.15	0.0953	ST2 >=50	1.87	1.47-2.38	<0.0001
In (eGFR)	1.58	0.85-2.94	0.1483	NYHA >= 3	1.84	1.45-2.32	<0.0001
In (Hgb)	0.34	0.17-0.68	0.002	Troponin >=16	1.88	1.25-2.8	0.0022
Age	1.05	1.03-1.07	<0.0001	In (Hgb)	0.34	0.18-0.68	0.0019
Troponin >=16	1.88	1.26-2.8	0.0021	In (NT-proBNP)	1.12	1.01-1.26	0.0401
ST2 >=50	1.89	1.49-2.4	<0.0001	Sex	1.2	0.94-1.54	0.1522
NYHA >= 3	1.84	1.46-2.32	<0.0001				
Fitted AUC:0.808				Fitted AUC:0.800			
bsAUC: 0.741 [0.665-0.816]				bsAUC: 0.743 [0.666-0.837]			
Forward Selection				Forward Selection			
HR	95% CI	P		HR	95% CI	P	
In (Troponin)	1.2	1-1.45	0.0534	In (Troponin)	1.2	1-1.45	0.0534
Age	1.04	1.03-1.05	<0.0001	Age	1.04	1.03-1.05	<0.0001
ST2 >=50	1.87	1.47-2.38	<0.0001	ST2 >=50	1.87	1.47-2.38	<0.0001
NYHA >= 3	1.84	1.45-2.32	<0.0001	NYHA >= 3	1.84	1.45-2.32	<0.0001
Troponin >=16	1.88	1.25-2.8	0.0022	Troponin >=16	1.88	1.25-2.8	0.0022
In (Hgb)	0.34	0.18-0.68	0.0019	In (Hgb)	0.34	0.18-0.68	0.0019
In (NT-proBNP)	1.12	1.01-1.26	0.0401	In (NT-proBNP)	1.12	1.01-1.26	0.0401
Sex	1.2	0.94-1.54	0.1522	Sex	1.2	0.94-1.54	0.1522
Fitted AUC:0.800				Fitted AUC:0.800			
bsAUC: 0.744 [0.667-0.821]				bsAUC: 0.744 [0.667-0.821]			

Fig. 34 Selected Models Based on BIC
1 Year Outcome

Fitted AUC:0.818 bsAUC: 0.798 [0.757-0.839]				Fitted AUC:0.818 bsAUC: 0.800 [0.760-0.841]			
Backward Selection				Stepwise Selection			
	HR	95% CI	P		HR	95% CI	P
ln (Troponin)	1.3	1.1-1.54	0.0022	ln (Troponin)	1.3	1.1-1.54	0.0022
ln (Hgb)	0.35	0.18-0.69	0.0021	Age	1.04	1.03-1.05	<0.0001
Age	1.04	1.03-1.05	<0.0001	ST2 >=50	2	1.58-2.52	<0.0001
Troponin >=16	1.95	1.31-2.9	0.001	NYHA >=3	1.83	1.45-2.3	<0.0001
ST2 >=50	2	1.58-2.52	<0.0001	Troponin >=16	1.95	1.31-2.9	0.001
NYHA >=3	1.83	1.45-2.3	<0.0001	ln (Hgb)	0.35	0.18-0.69	0.0021
Fitted AUC:0.818 bsAUC: 0.801 [0.760-0.841]				Forward Selection			
	HR	95% CI	P		HR	95% CI	P
ln (Troponin)	1.3	1.1-1.54	0.0022	ln (Troponin)	1.3	1.1-1.54	0.0022
Age	1.04	1.03-1.05	<0.0001	Age	1.04	1.03-1.05	<0.0001
ST2 >=50	2	1.58-2.52	<0.0001	ST2 >=50	2	1.58-2.52	<0.0001
NYHA >=3	1.83	1.45-2.3	<0.0001	NYHA >=3	1.83	1.45-2.3	<0.0001
Troponin >=16	1.95	1.31-2.9	0.001	Troponin >=16	1.95	1.31-2.9	0.001
ln (Hgb)	0.35	0.18-0.69	0.0021	ln (Hgb)	0.35	0.18-0.69	0.0021

Fig. 35 Colinearity



CRP and ST2 has a high correlation coefficient, but scatter plot does not look bad

Fig. 36 Univariate Performance

Variable	Outcome=0 Median [IQR]	Outcome=1 Median [IQR]	Test P Value	sOR(Raw) Est [95% CI]	LRT p	sOR(ln) Est [95% CI]	LRT p	AuROC
Age_yr	73.5[61.5-81]	80[74-85]	0.001	1.75 [1.25-2.55]	<0.001	1.84 [1.27-2.8]	<0.001	0.641
Sex	0=70;1=78	0=32;1=29	0.544	0.81 [0.45-1.48]	0.497			
Ethnicity	1=131;5=11;6=5;7=1	1=56;5=2;6=3	0.646		0.502			
Is_Black	0=137;1=11	0=59;1=2	0.354	0.42 [0.06-1.63]	0.231			
SBP	140[124-156.25]	130[110-151]	0.022	0.68 [0.48-0.93]	0.016	0.68 [0.49-0.92]	0.013	0.601
DBP	75[66-86.25]	74[61-83]	0.411	0.91 [0.67-1.23]	0.553	0.9 [0.66-1.21]	0.474	0.536
BMI	26.98[23.88-32]	26.61[21.92-29.75]	0.036	0.65 [0.45-0.9]	0.009	0.67 [0.48-0.92]	0.012	0.592
HTN	0=55;1=93	0=21;1=40	0.754	1.13 [0.61-2.13]	0.708			
Diabetes	0=85;1=63	0=36;1=25	0.878	0.94 [0.51-1.71]	0.833			
CAD	0=93;1=55	0=28;1=33	0.031	1.99 [1.09-3.67]	0.025			
LVEF	52[36-62]	51[30-67]	0.844	0.94 [0.7-1.27]	0.685	0.9 [0.67-1.22]	0.491	0.509
eGFR	54.69[40.99-79.85]	48.91[35.7-60.53]	0.008	0.59 [0.4-0.83]	0.002	0.64 [0.46-0.87]	0.005	0.617
Creatinine	1.2[0.9-1.6]	1.4[1.1-1.5]	0.065	1.35 [1-1.82]	0.047	1.41 [1.04-1.93]	0.027	0.581
BUN	23[17-32]	31[24-41]	<0.001	1.64 [1.22-2.27]	<0.001	1.77 [1.29-2.48]	<0.001	0.669
HGB_g_dl	12.7[11-14.3]	11.3[10.1-12.5]	0.001	0.63 [0.46-0.87]	0.004	0.68 [0.49-0.91]	0.01	0.641
cTnT1	0[0-0.03]	0.03[0-0.06]	0.002	0.92 [0.55-1.24]	0.611	1.01 [0.72-1.34]	0.932	0.628
NTproBNP_pg_ml	3122.5[1401-7947.25]	9020[3366-12991]	<0.001	1.61 [1.15-2.43]	0.004	2.03 [1.46-2.9]	<0.001	0.685
CRP_mg_ml	11.9[3.77-36.12]	36.5[9.5-92.2]	<0.001	1.61 [1.21-2.2]	0.001	1.85 [1.34-2.61]	<0.001	0.666
ST2_ng_ml	37.02[23.43-64.69]	67.39[41.62-97.23]	<0.001	1.77 [1.31-2.48]	<0.001	1.9 [1.37-2.69]	<0.001	0.692

Recall in the entire PRIDE data set, missing LVEF was not random. In this subpopulation only 6 subjects have missing LVEF data (4 cases and 2 controls)->OR=5.07 (p=0.06)

BUN looks strongest in a univariate sense

Fig. 37 Linearity Evaluation: Age

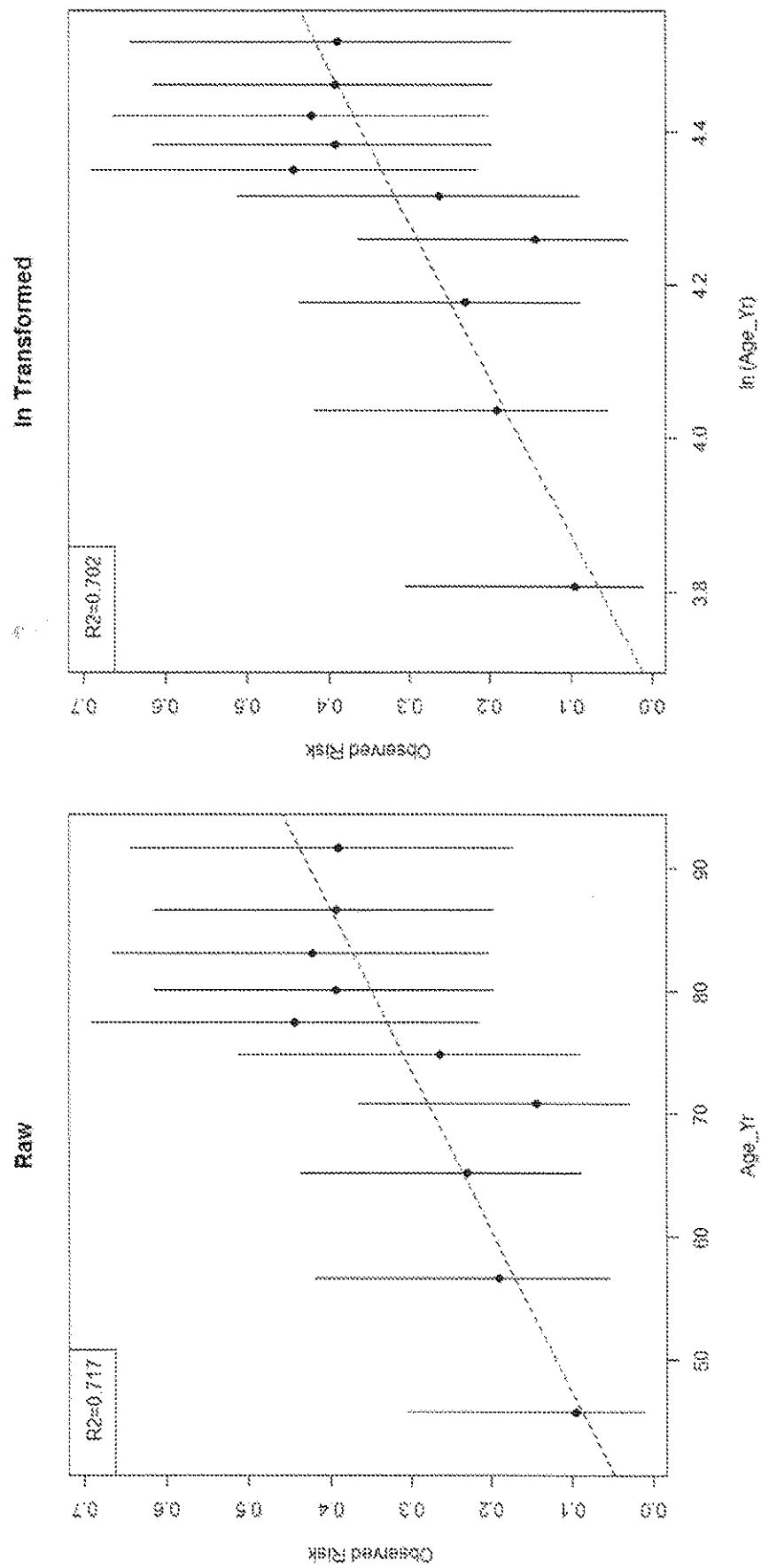


Fig. 38 Linearity Evaluation: SBP

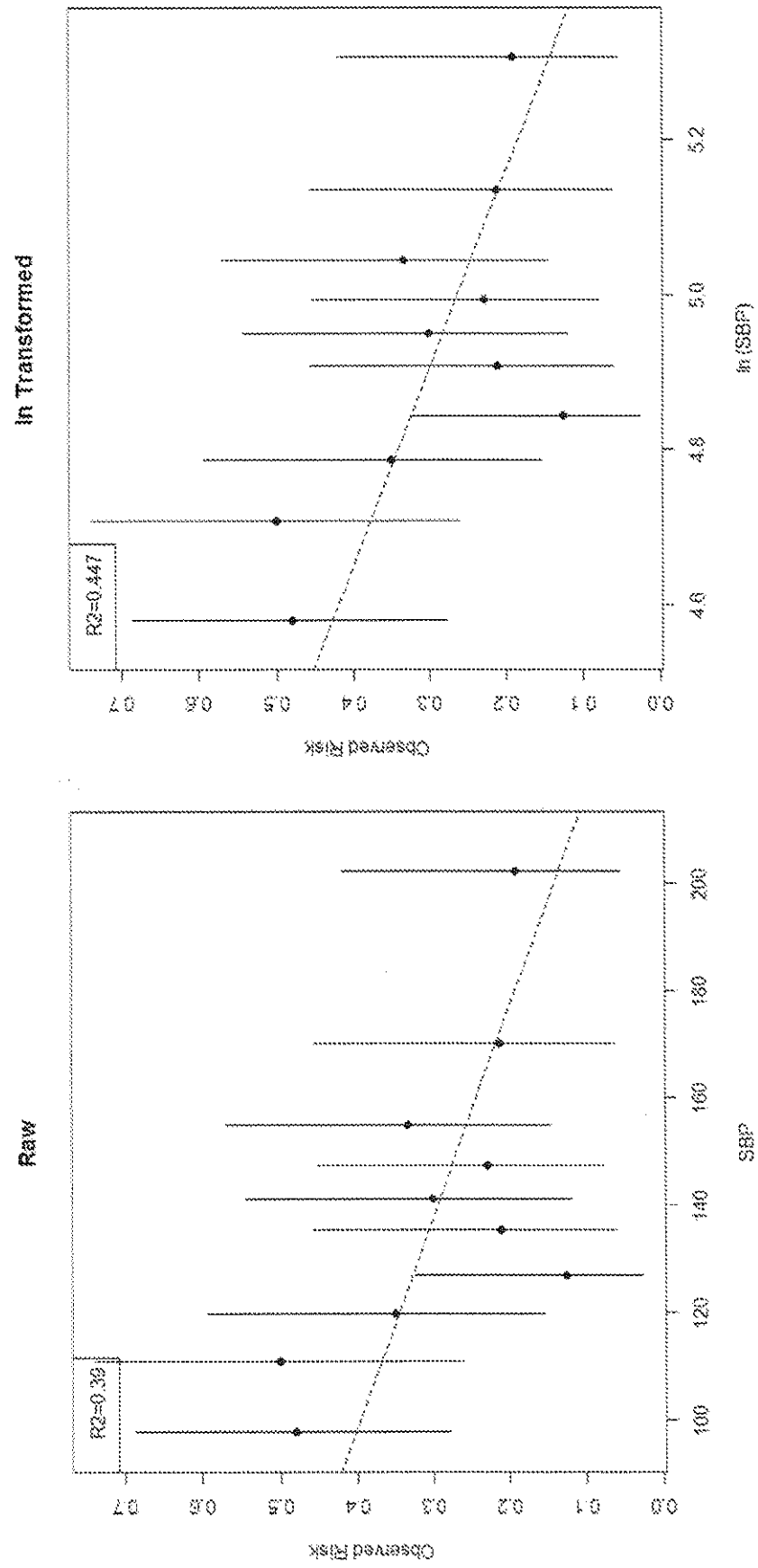


Fig. 39 Linearity Evaluation: DBP

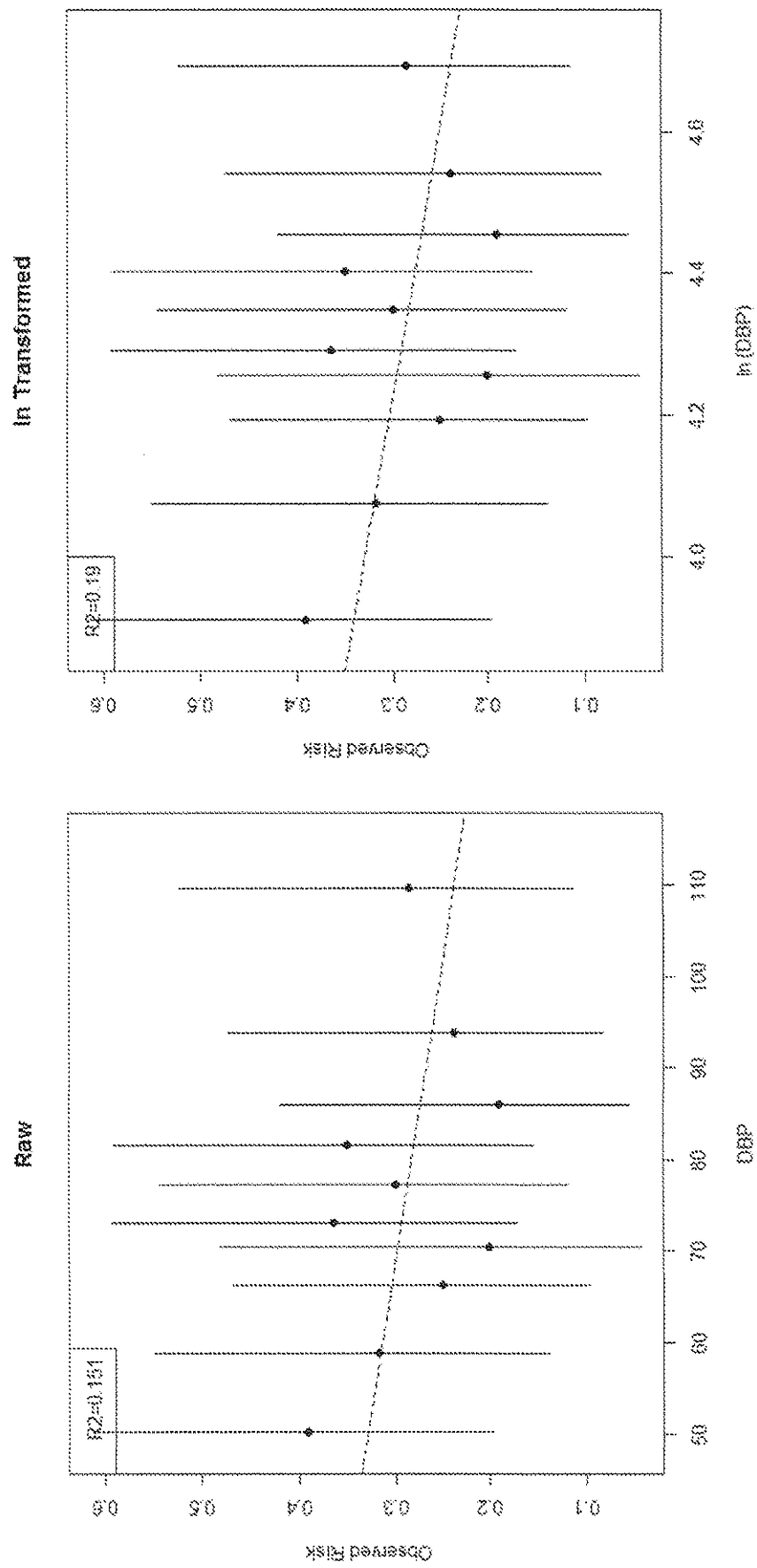


Fig. 40 Linearity Evaluation: BMI

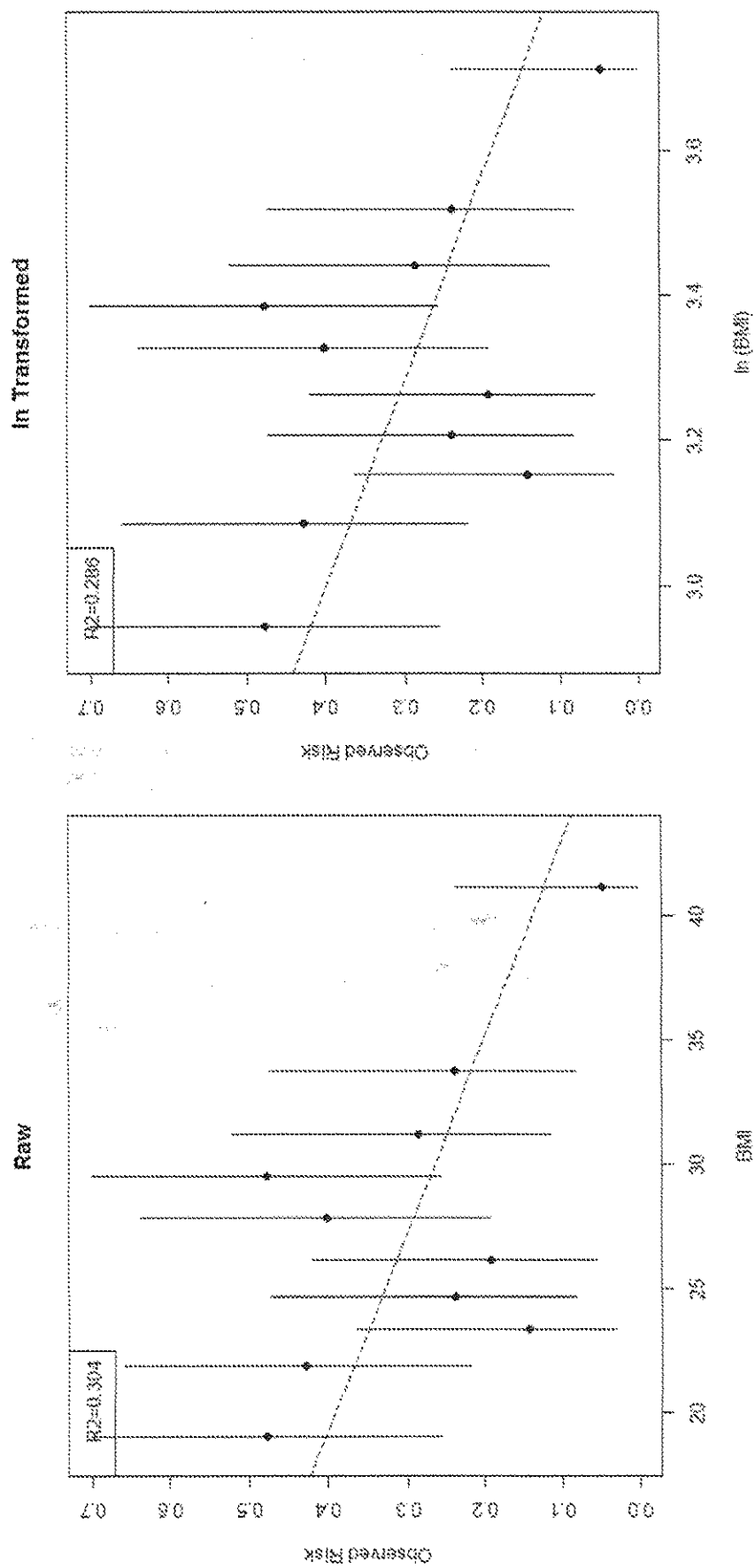


Fig. 41 Linearity Evaluation: LVEF

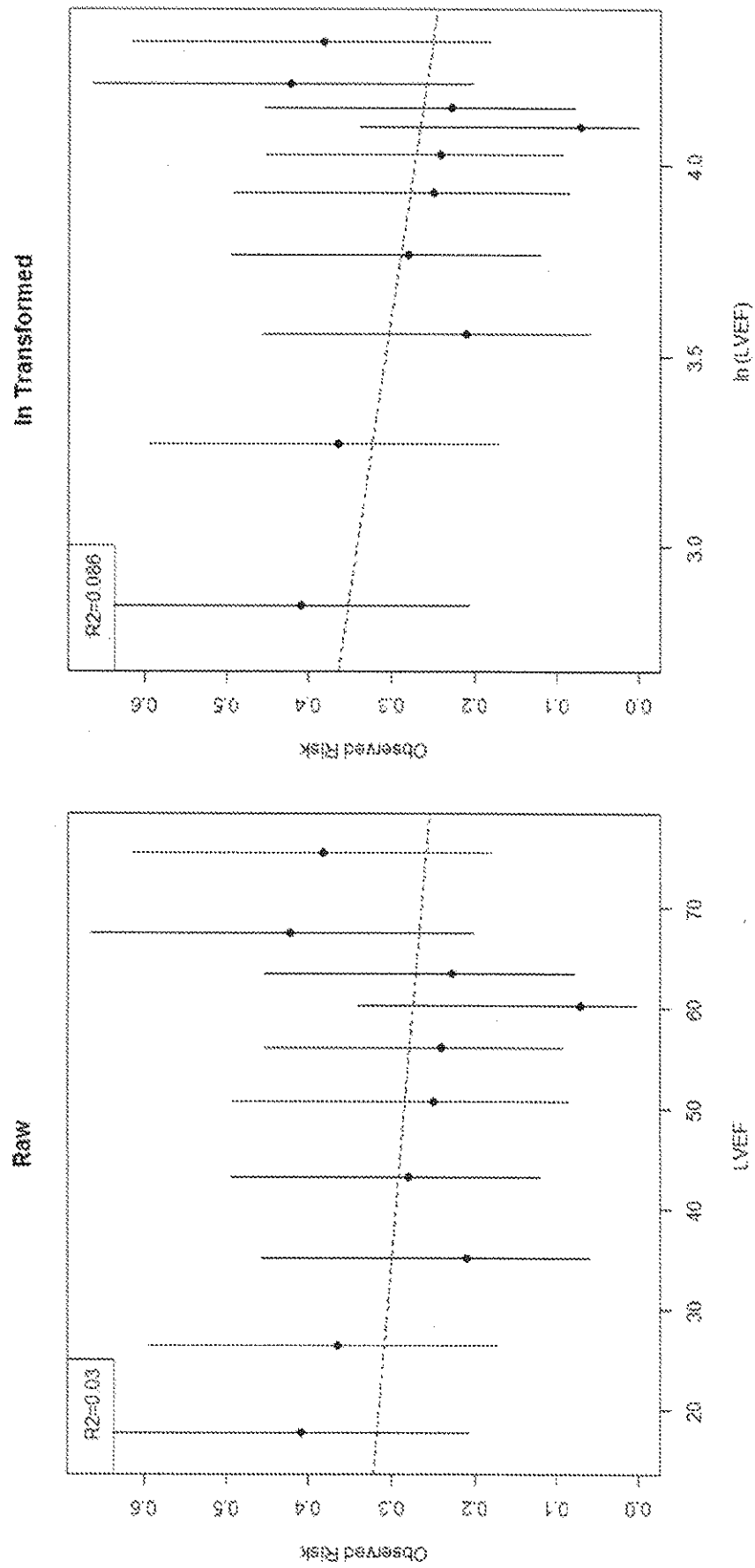


Fig. 42 Linearity Check: eGFR

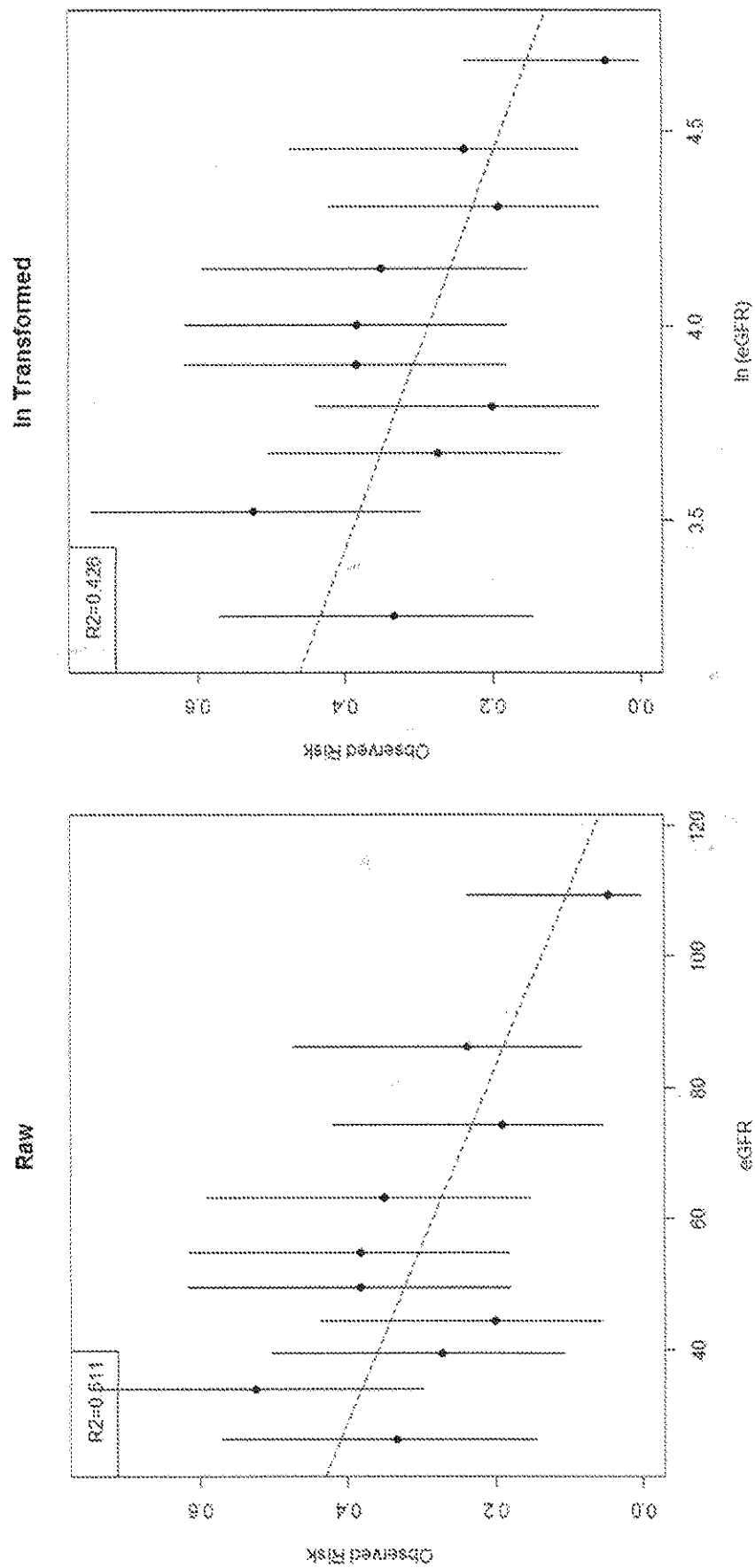


Fig. 43 Linearity Check: Creatinine

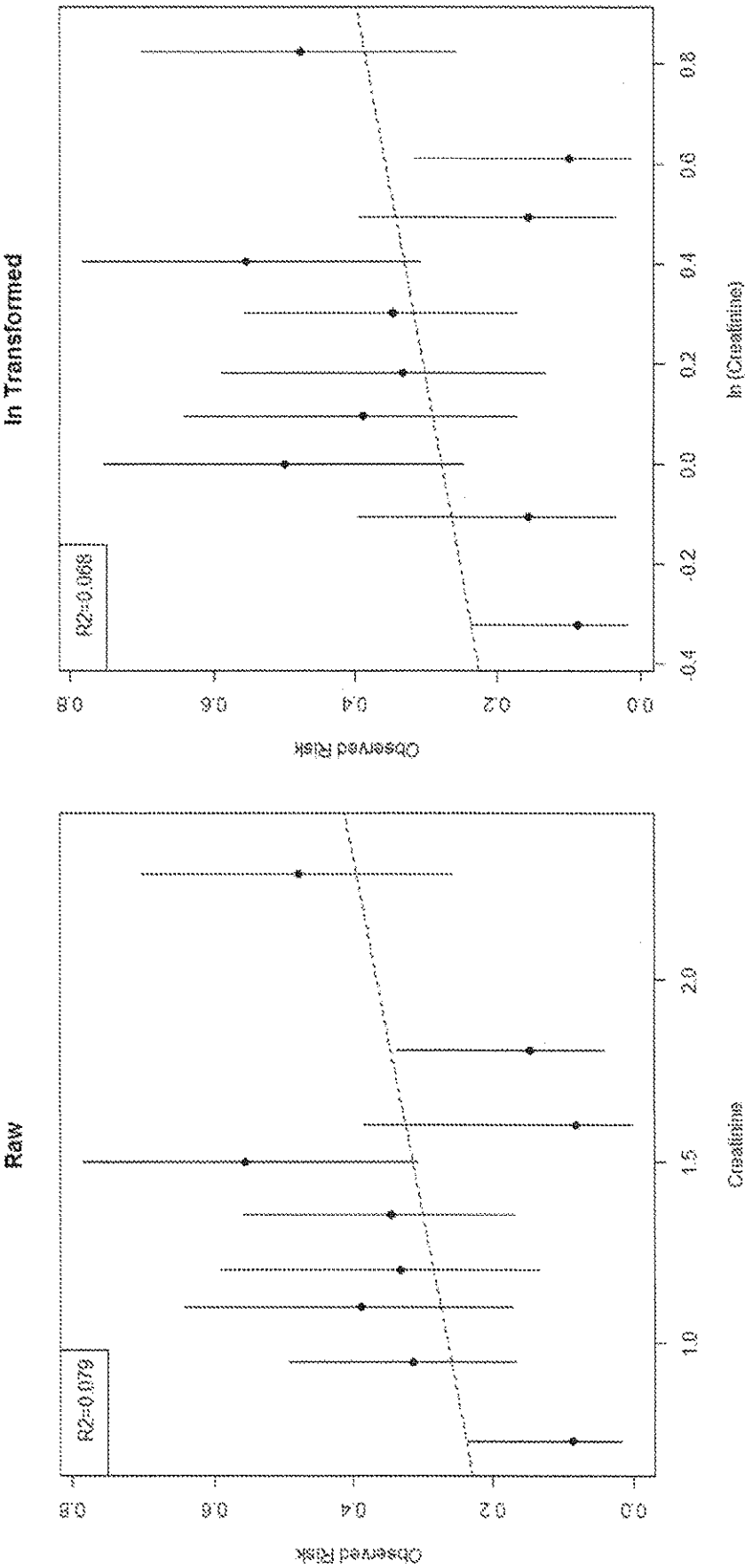


Fig. 44 Linearity Check: BUN

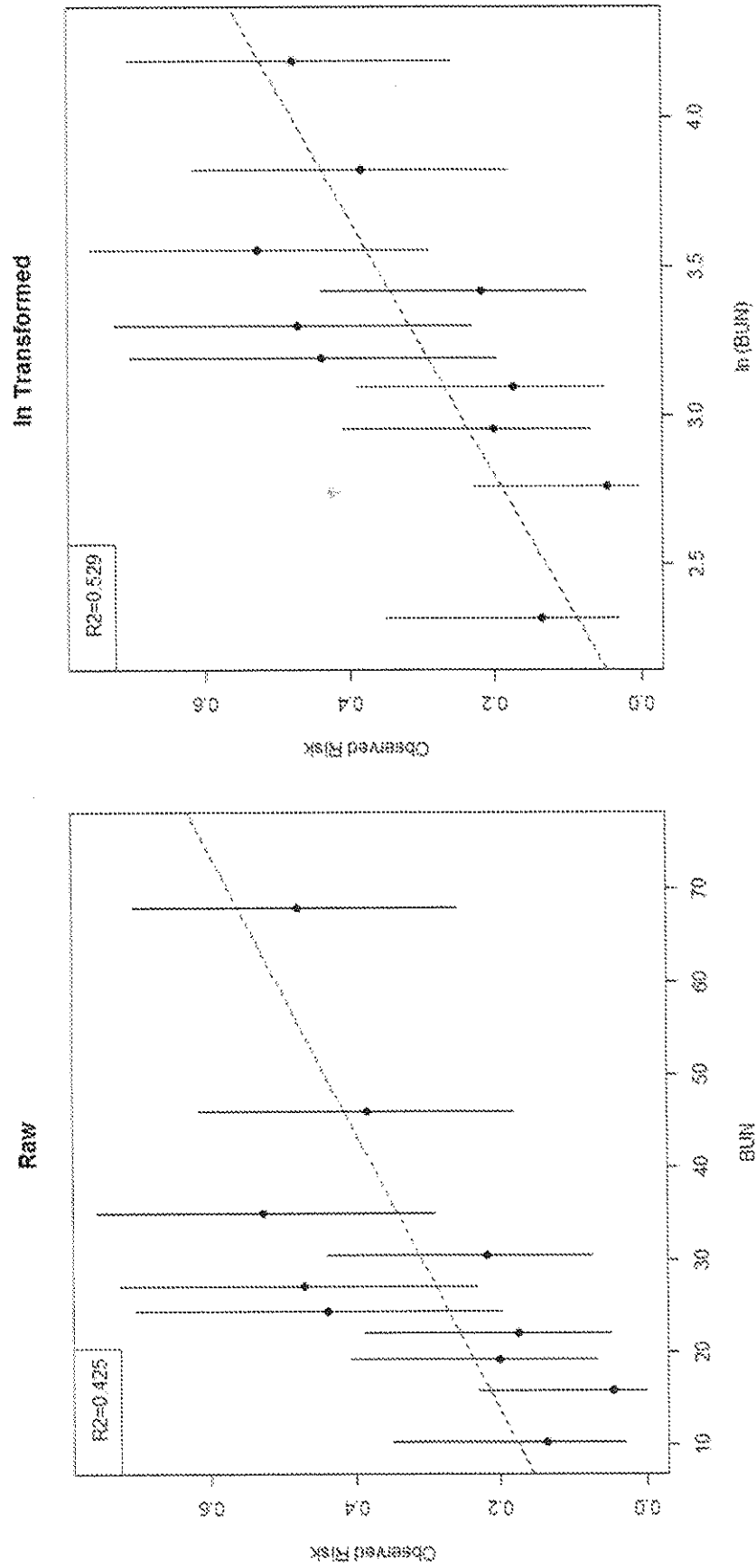


Fig. 45 Linearity Check: Hemoglobin

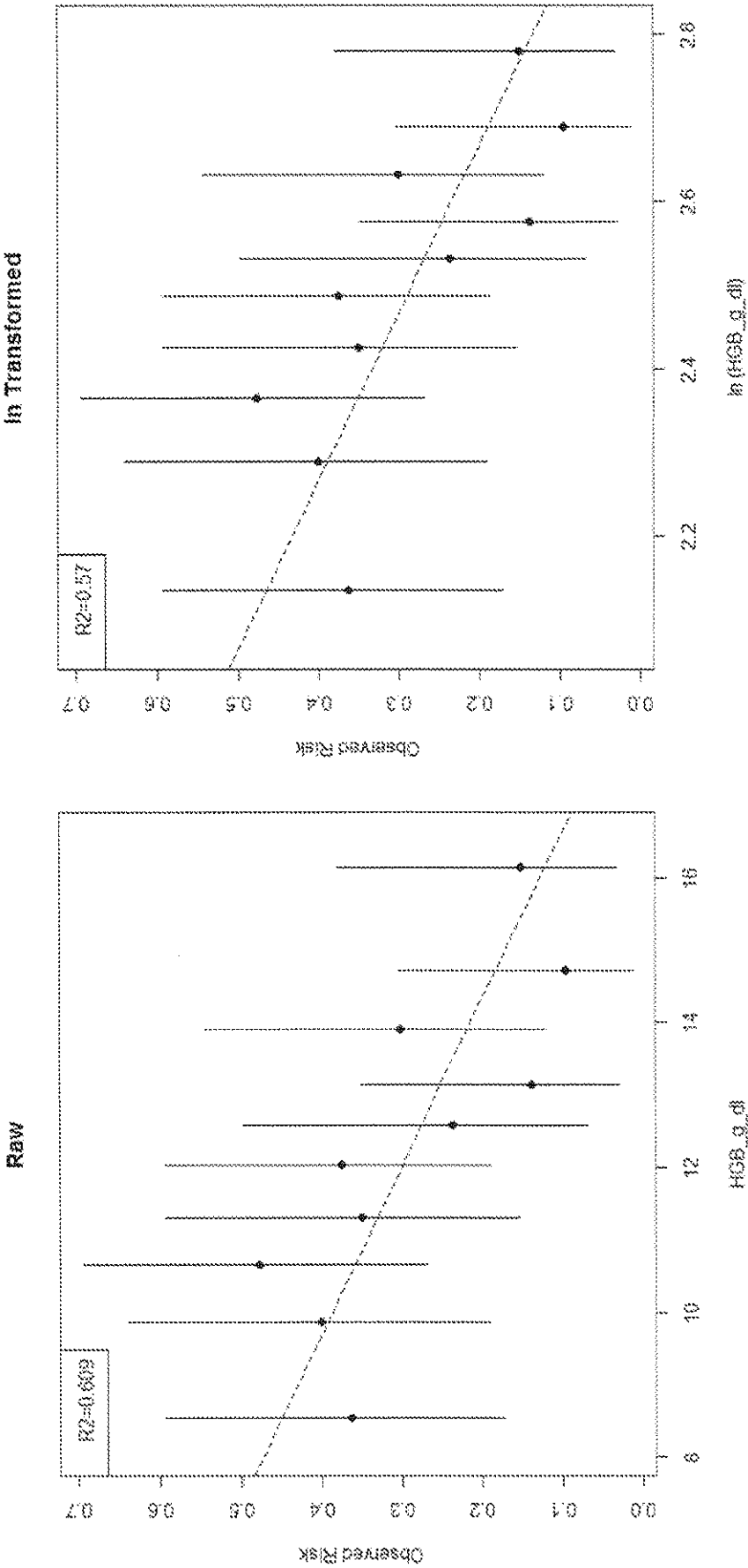


Fig. 46 Linearity Check: Troponin

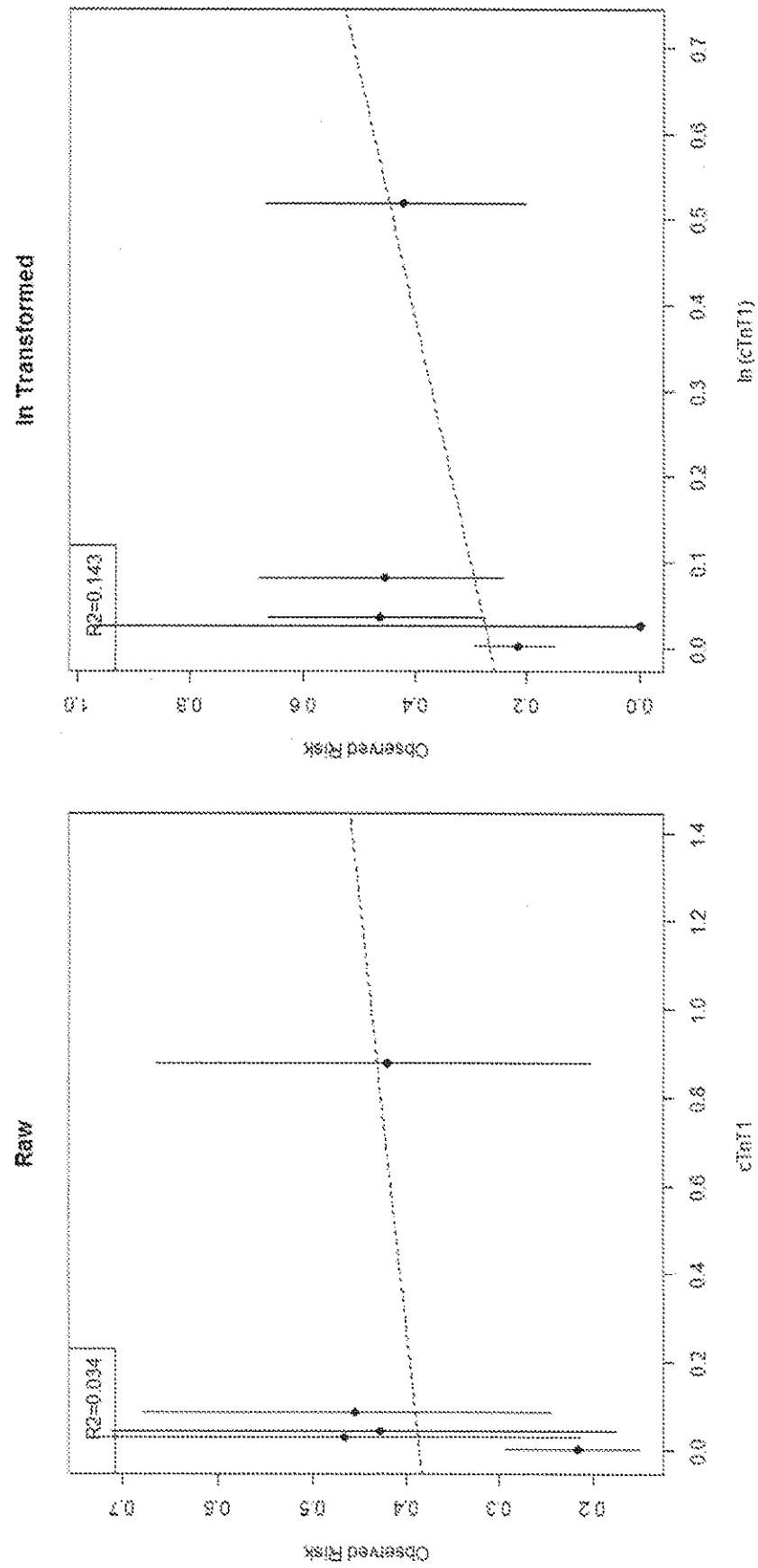


Fig. 47 Linearity Check: NT-proBNP

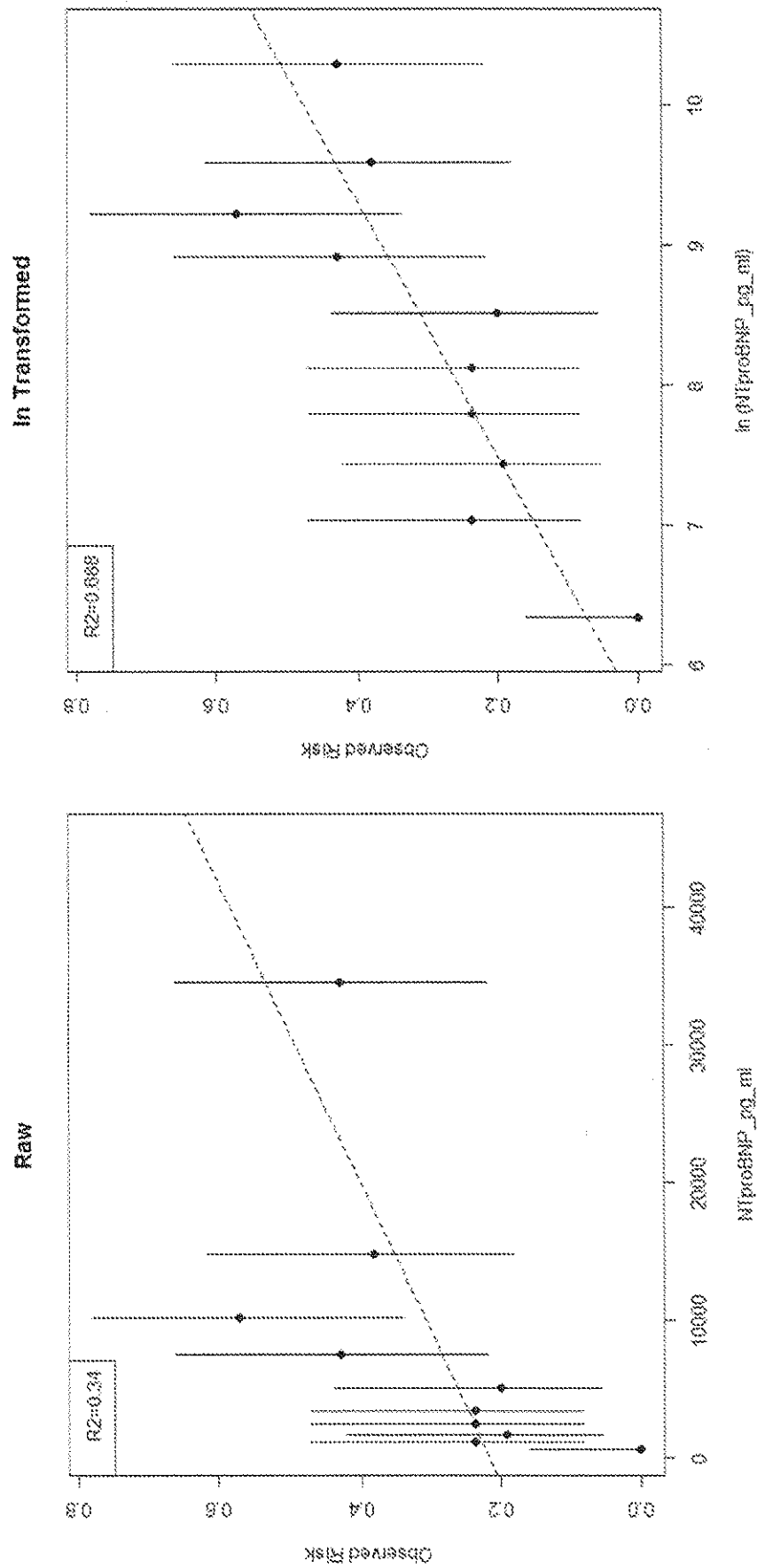


Fig. 48 Linearity Check: CRP

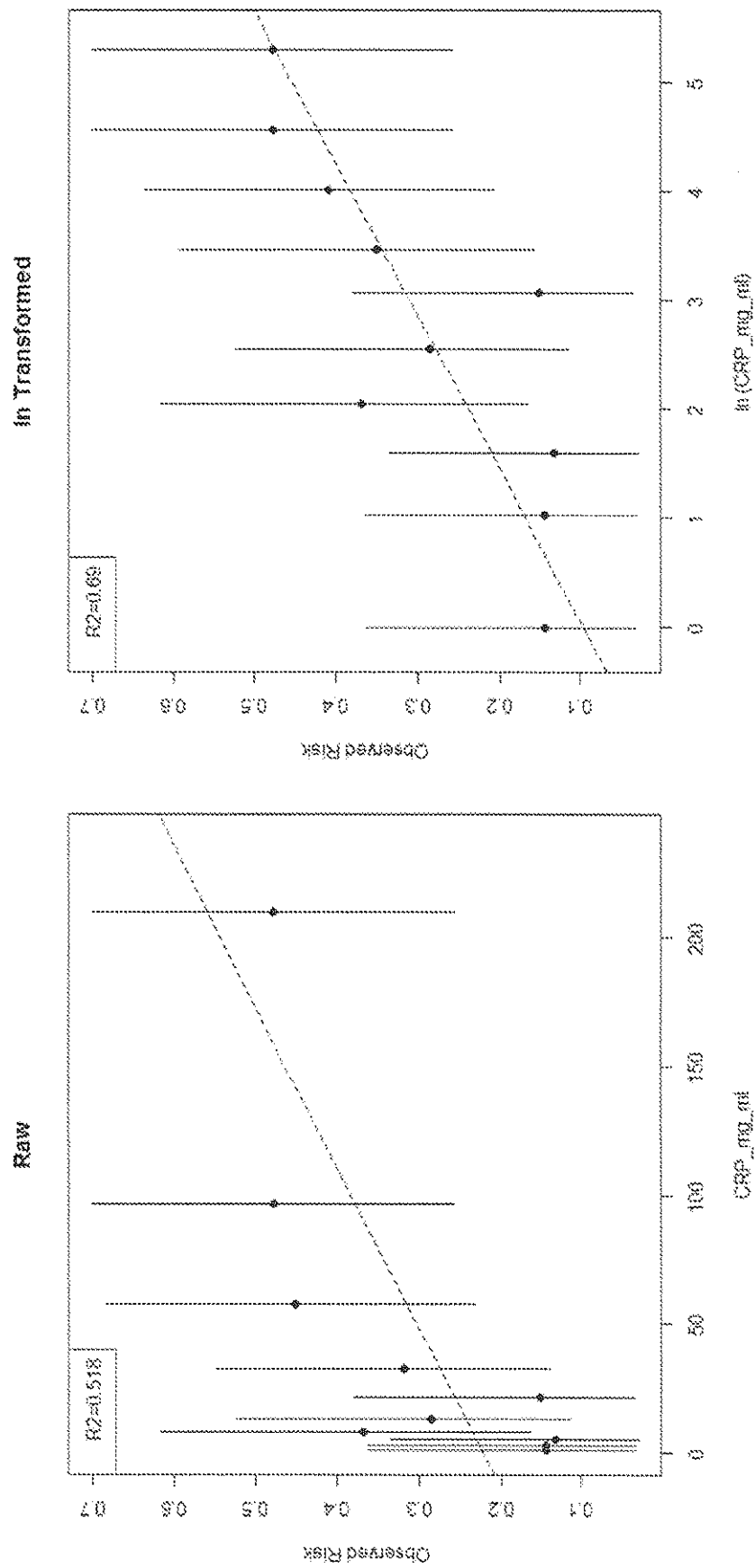


Fig. 49 Linearity Check: ST2

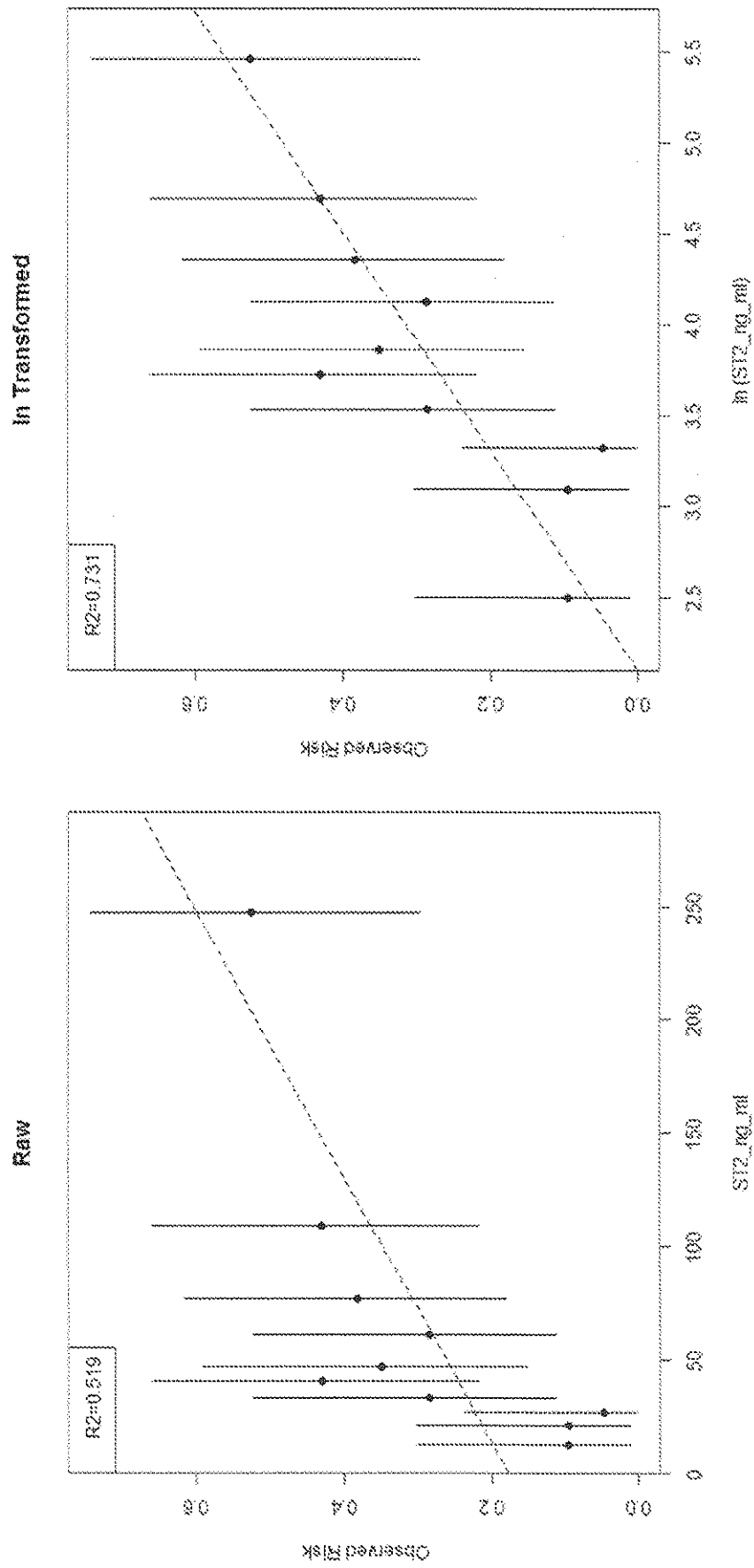


Fig. 50 Summary

	AIC		Other	Comment	Graph
	Raw	Log			
Age	245.31	245.14			Raw
SBP	250.6	250.2	245.85	>120	log
DBP	256.04	255.88			log
BMI	249.49	250.1			Raw
LVEF	256.23	255.92			?
eGFR	246.93	248.39			Raw
Creatinine	252.44	251.53			Raw
BUN	245.5	243.6			log
Hemoglobin	248.07	249.81			Raw
Troponin	256.14	256.39	247.08	>0	?
NT-proBNP	247.98	237.46			log
CRP	245.74	241.77			log
ST2	241.74	240.61	238.15	>=35	log

- Parameter Space

- Age
- Log(SBP)
- SBP>120
- Log(DBP)
- BMI
- Log(LVEF)
- Log(BUN)
- Hemoglobin
- Troponin
- Troponin>0
- Log(NT-proBNP)
- Log(CRP)
- Log(ST2)
- ST2>=35
- Other factors (Sex, Race, Diabetes, HTN, CAD, IS_Black)

AIC (Smaller is better) generally agrees with graphical approach. Bins will be considered for ST2, SBP, and Troponin

Fig. 51 Marker Selection (AIC)

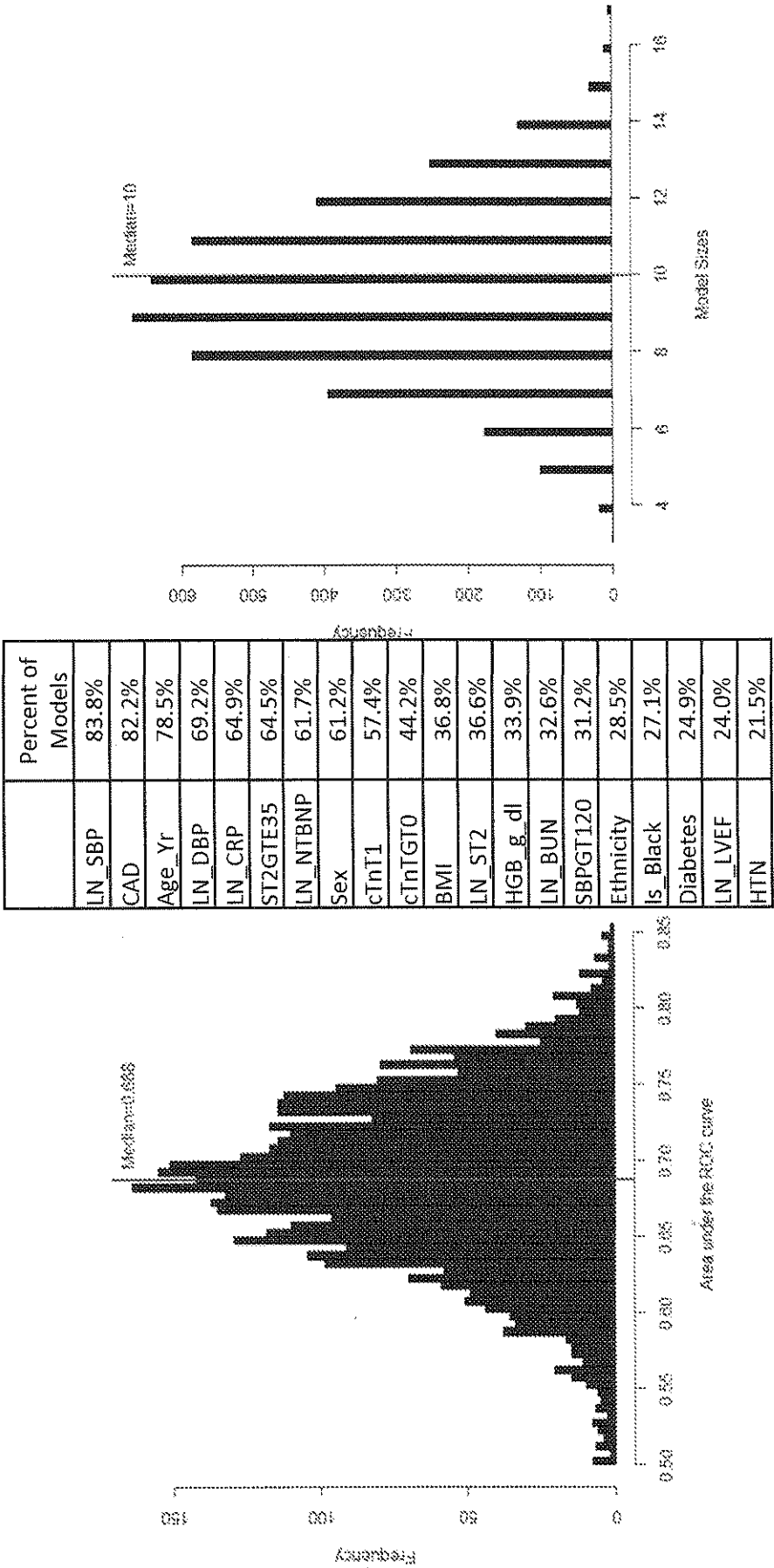


Fig. 52 BIC Based Marker Selection

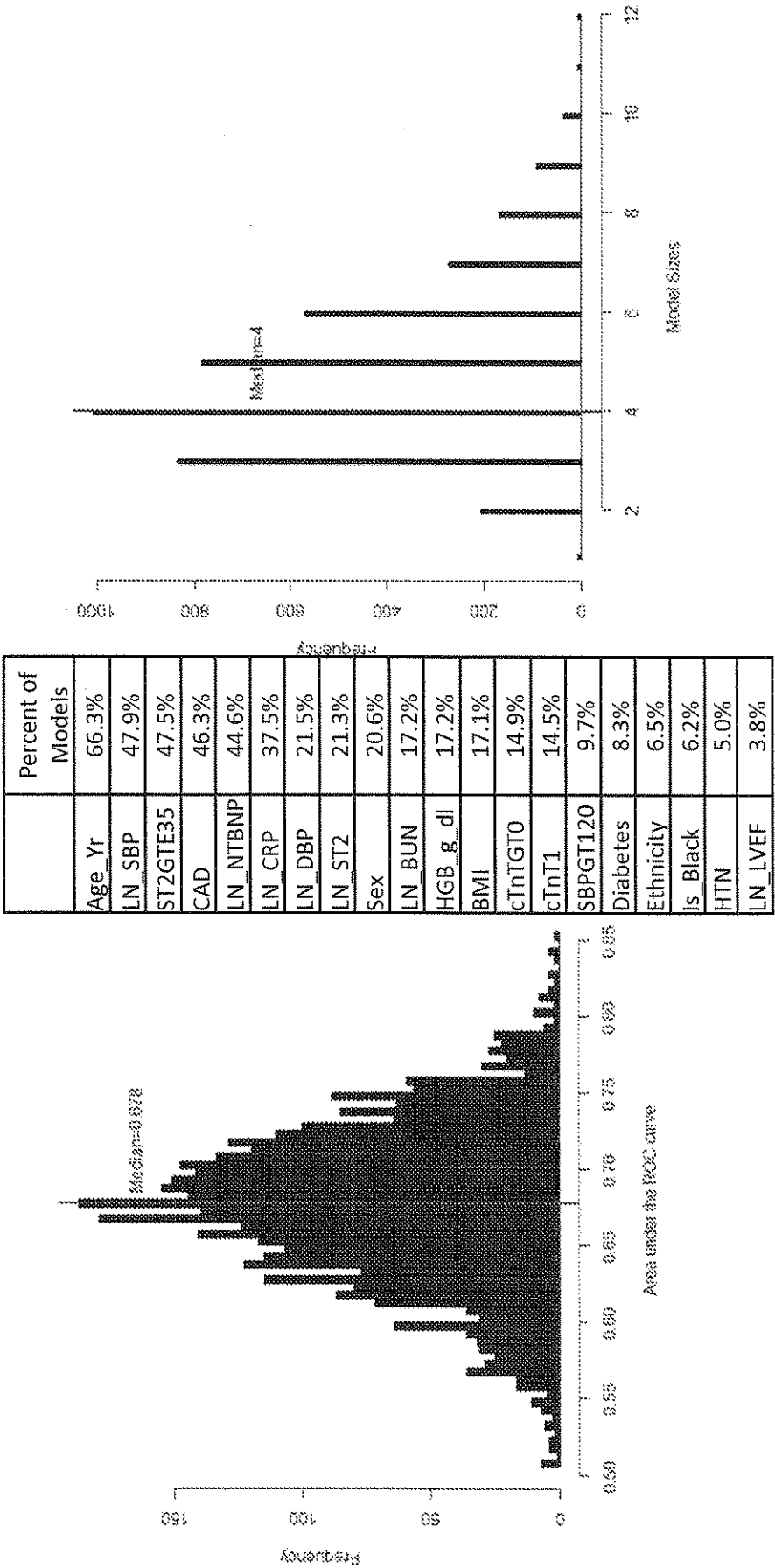


Fig. 53 Comparison of the Two Models

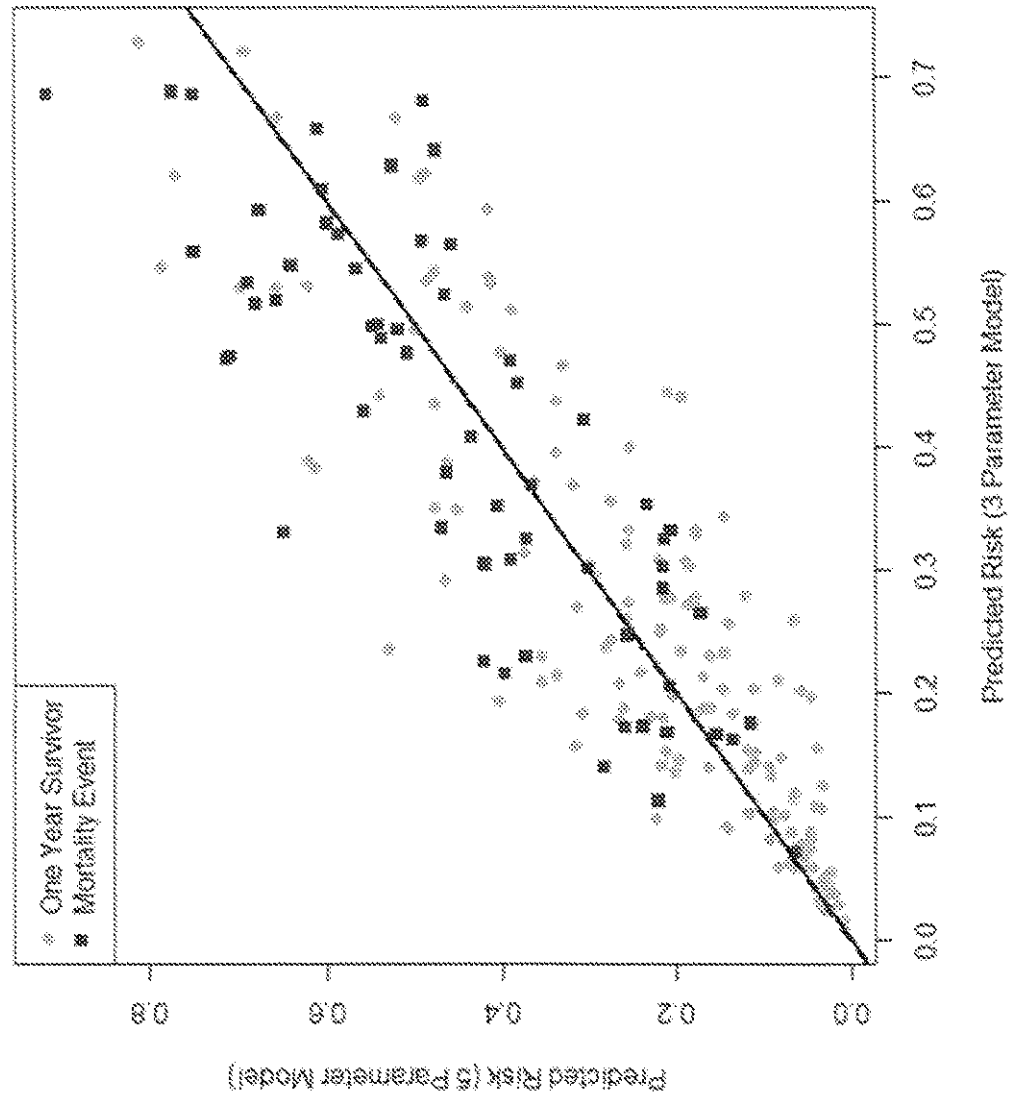


Fig. 54 ROC Curves

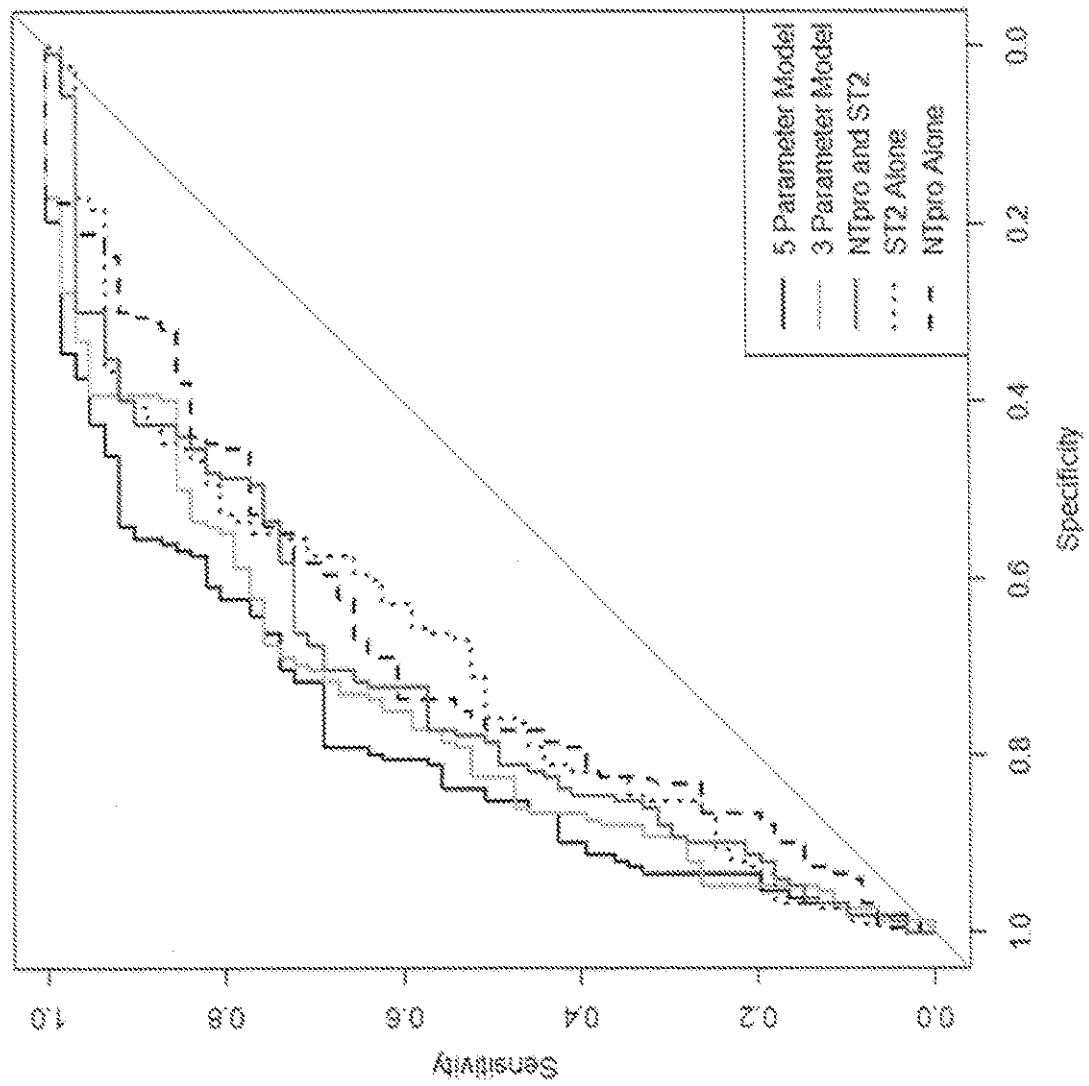


Fig. 55 Bootstrap AUC
“Out of Bag” estimates

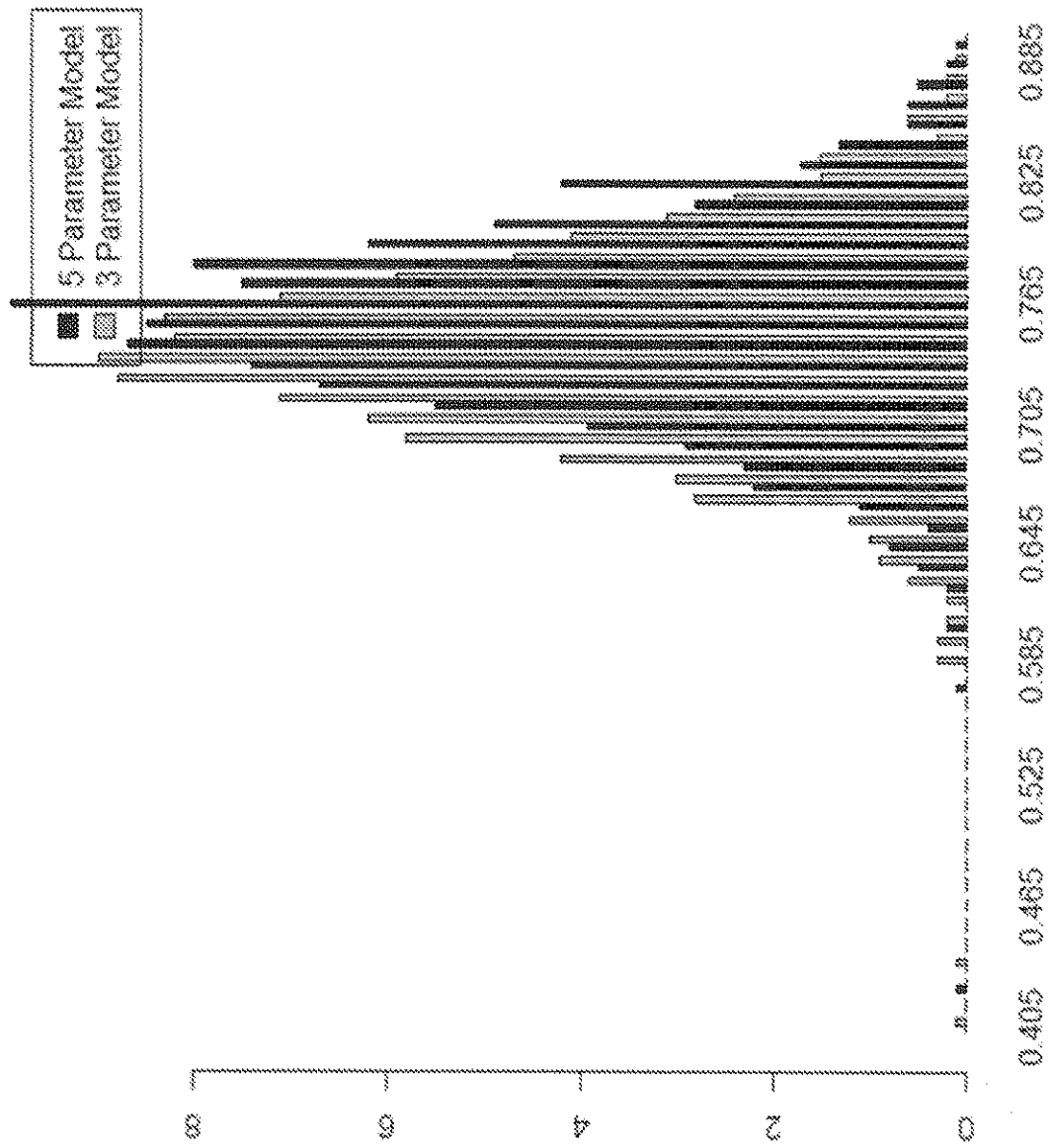


Fig. 56 Model Calibration

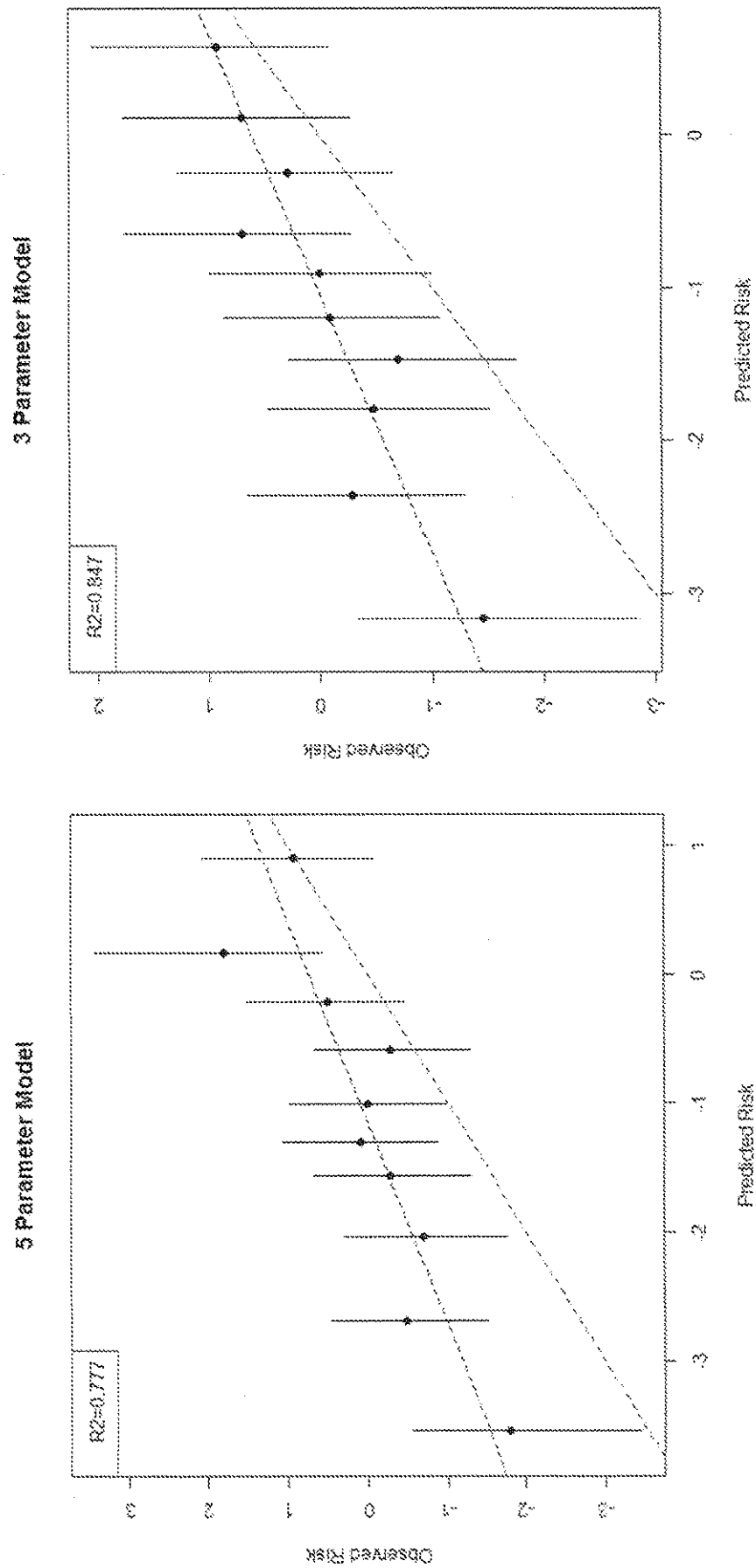


Fig. 57 Model Parameters

5 Parameter Model

Coefficients:

	Estimate	Std. Error	z	value	Pr(> z)
(Intercept)	1.6996	4.3544	0.39		0.6963
Age_Yr	0.0403	0.0154	2.62		0.0087 **
LN_SBP	-2.1065	0.8663	-2.43		0.0150 *
CAD	0.7824	0.3607	2.17		0.0301 *
ST2GTE35	1.3846	0.4384	3.16		0.0016 **
LN_NTBNP	0.4023	0.1668	2.41		0.0159 *

 Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

3 Parameter Model

Coefficients:

	Estimate	Std. Error	z	value	Pr(> z)
(Intercept)	-8.3383	1.6970	-4.91		8.9e-07 ***
Age_Yr	0.0426	0.0144	2.96		0.0030 **
ST2GTE35	1.2656	0.4164	3.04		0.0024 **
LN_NTBNP	0.3998	0.1586	2.52		0.0117 *

 Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1