

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	Gaussian
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	ln
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	ln
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	ln
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	ln
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	ln
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	ln
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	ln
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	ln
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(ln)			Most
	Median [IQR]	Missing	Median [IQR]	Missing		Est [95% CI]	log-rank p	AuROC	Est [95% CI]	log-rank p	AuROC	
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	0.684	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	0.725	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	0.643	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	0.711	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	0.517	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	0.571	0.81 [0.72-0.91]	<0.001	0.571	In
HGB_g_dI	13.2[12-14.5]	0	12.1[11.1-13.6]	0	<0.001	0.68 [0.62-0.75]	<0.001	0.654	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	0.737	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	0.662	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	0.503	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	0.558	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-Inf]	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

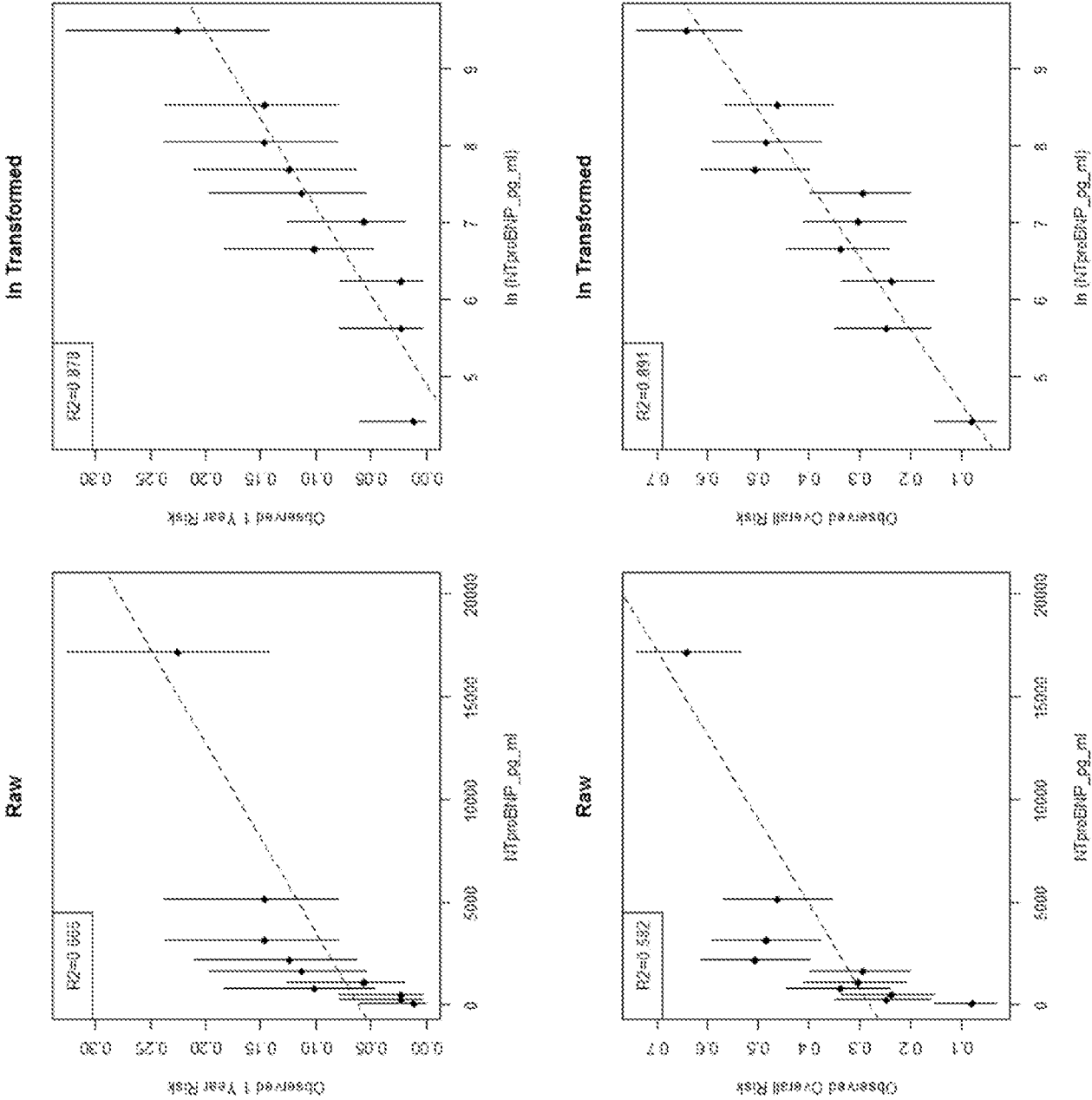


Fig. 4 Cut-Point Evaluation
NT-proBNP

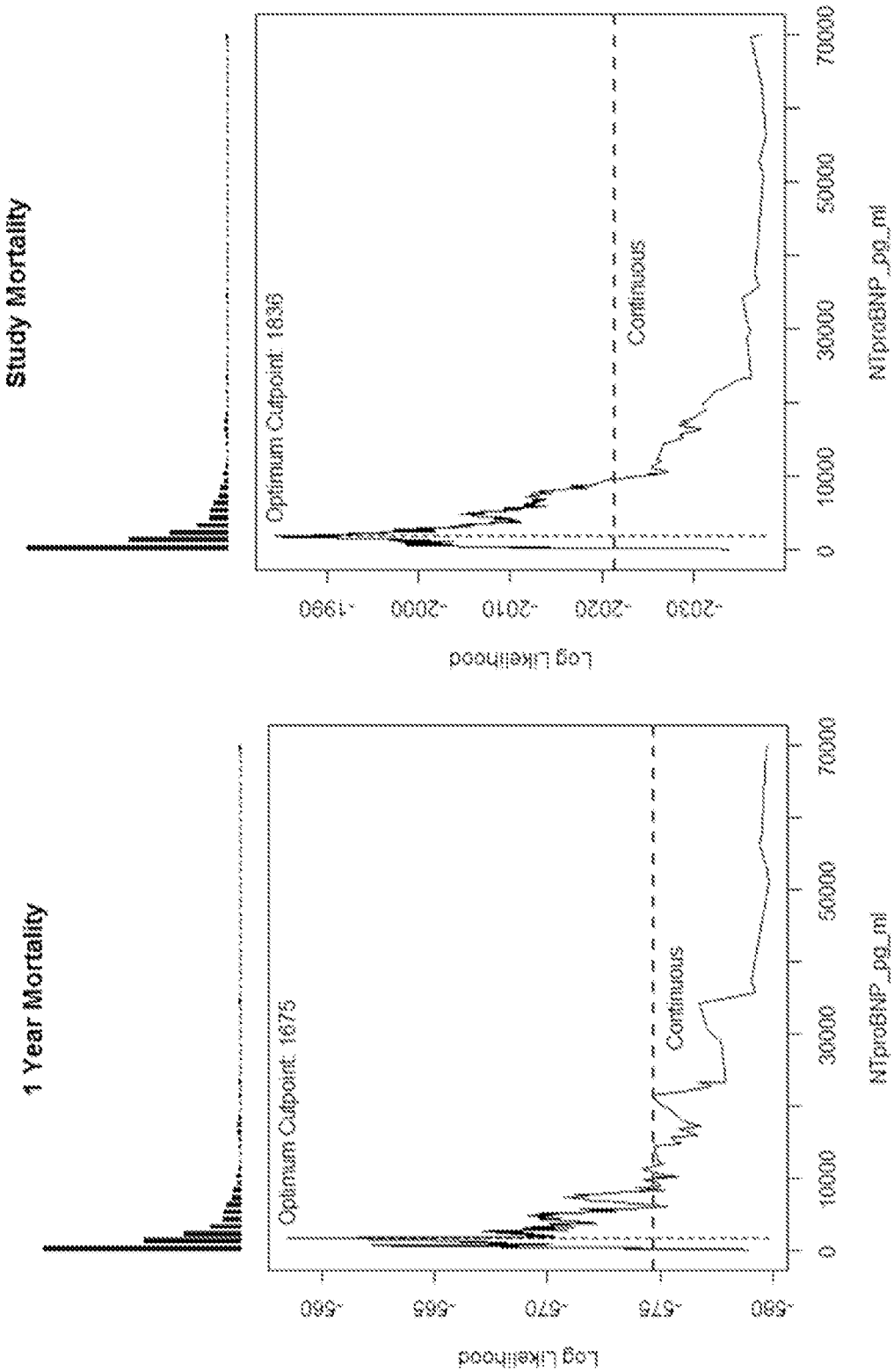


Fig. 5 Linearity Check: Troponin

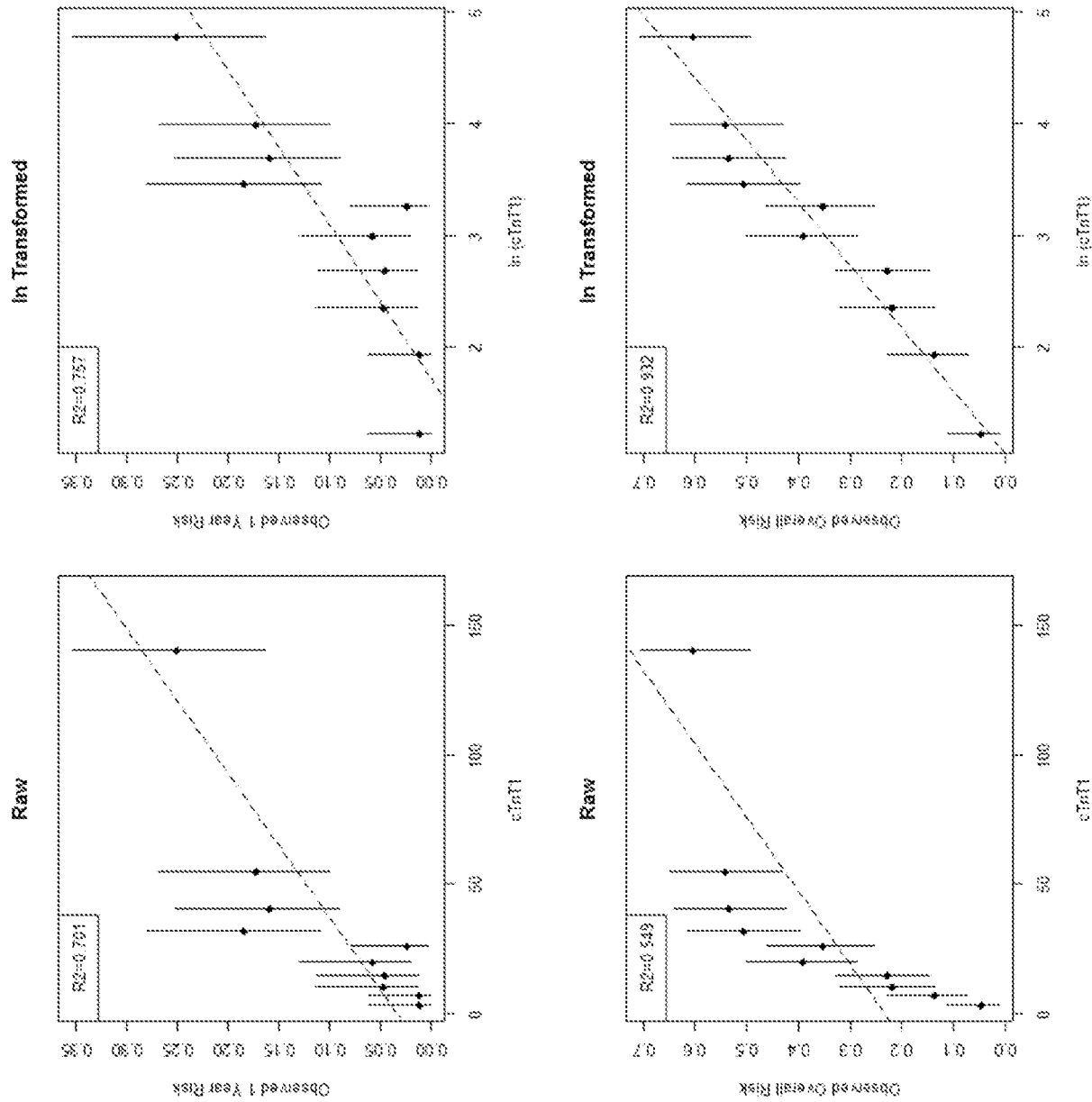


Fig. 6 Cut-Point Evaluation Troponin

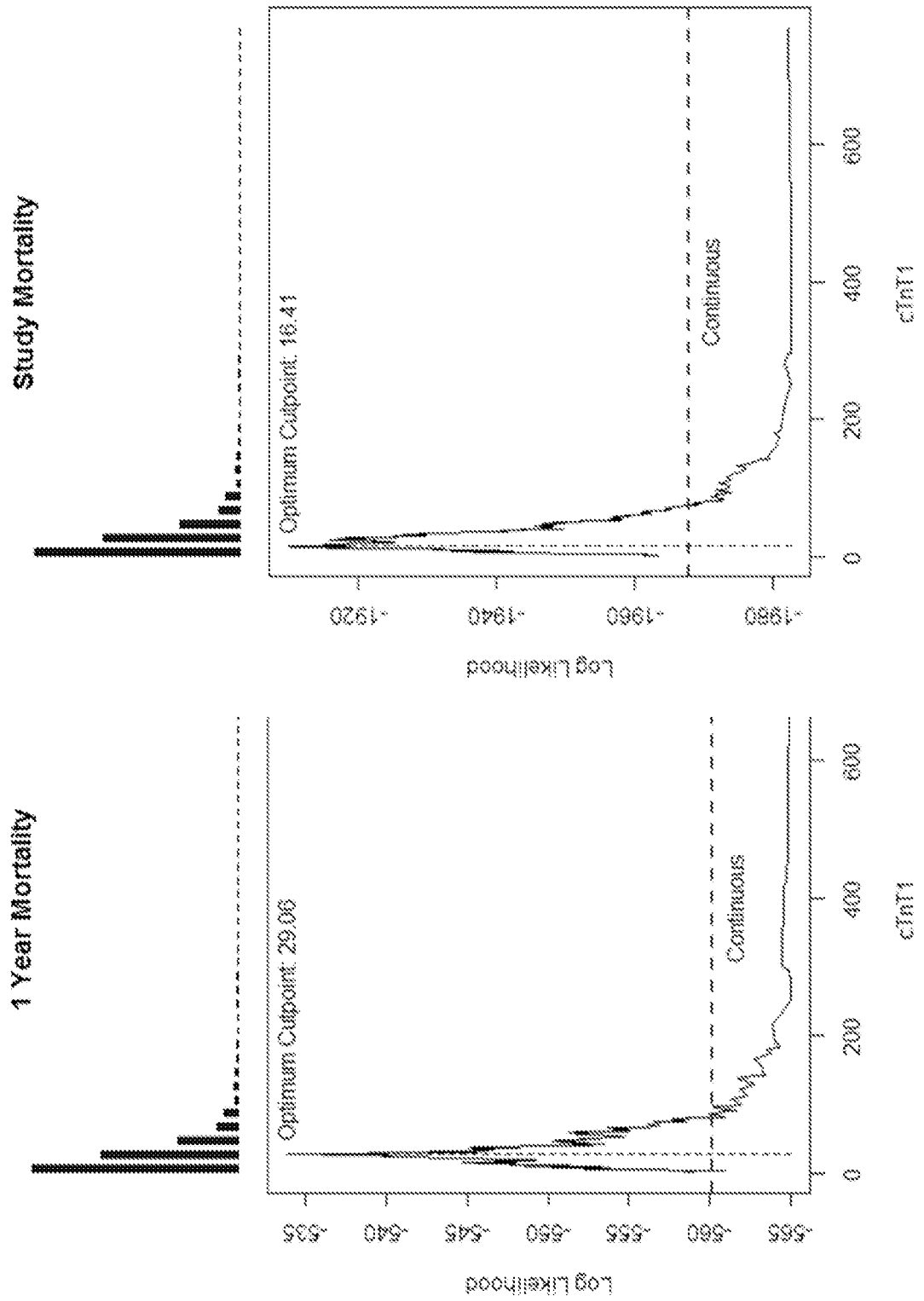


Fig. 7 Linearity Check: Creatinine

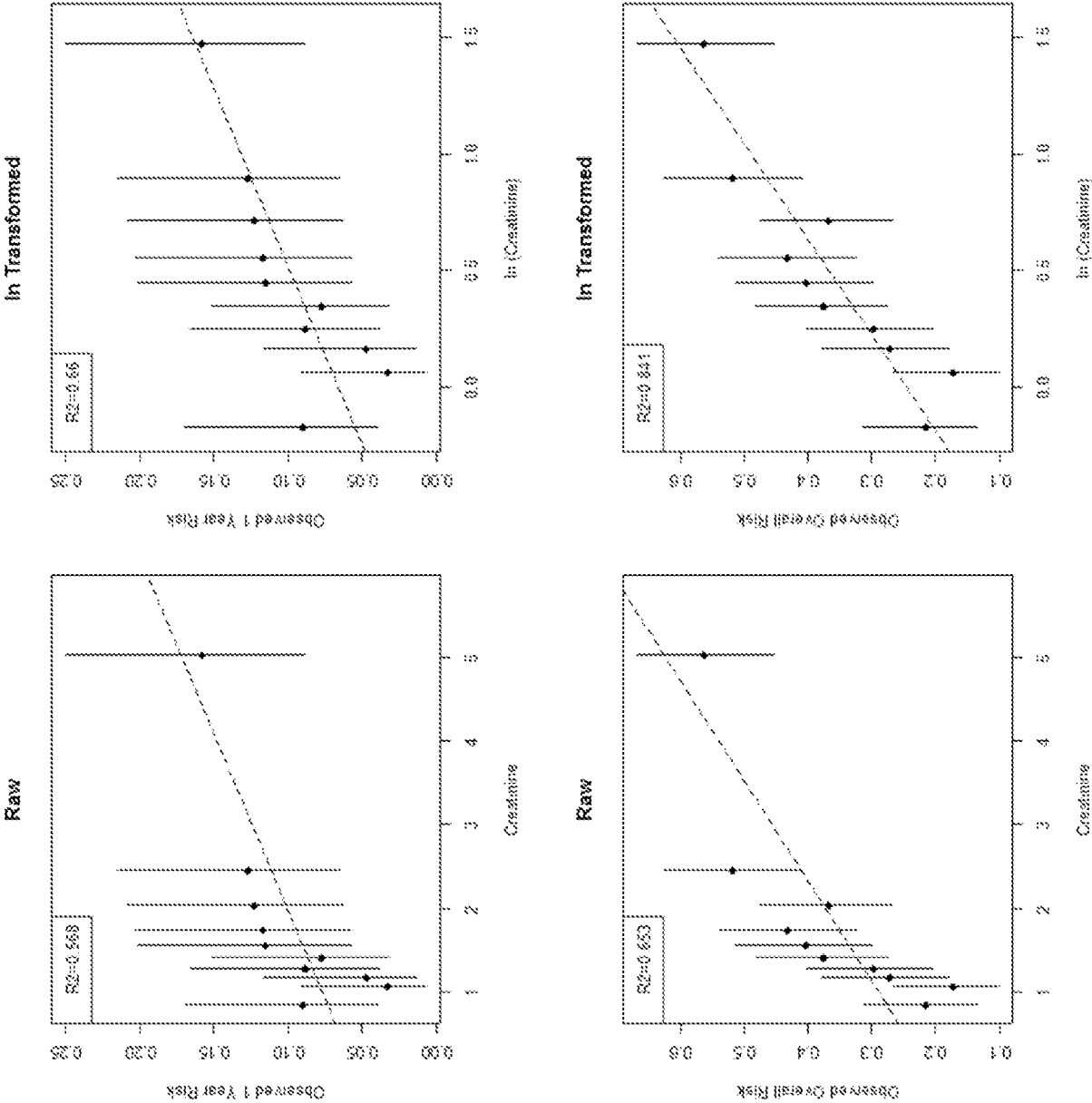


Fig. 8 Cut-Point Evaluation Creatinine

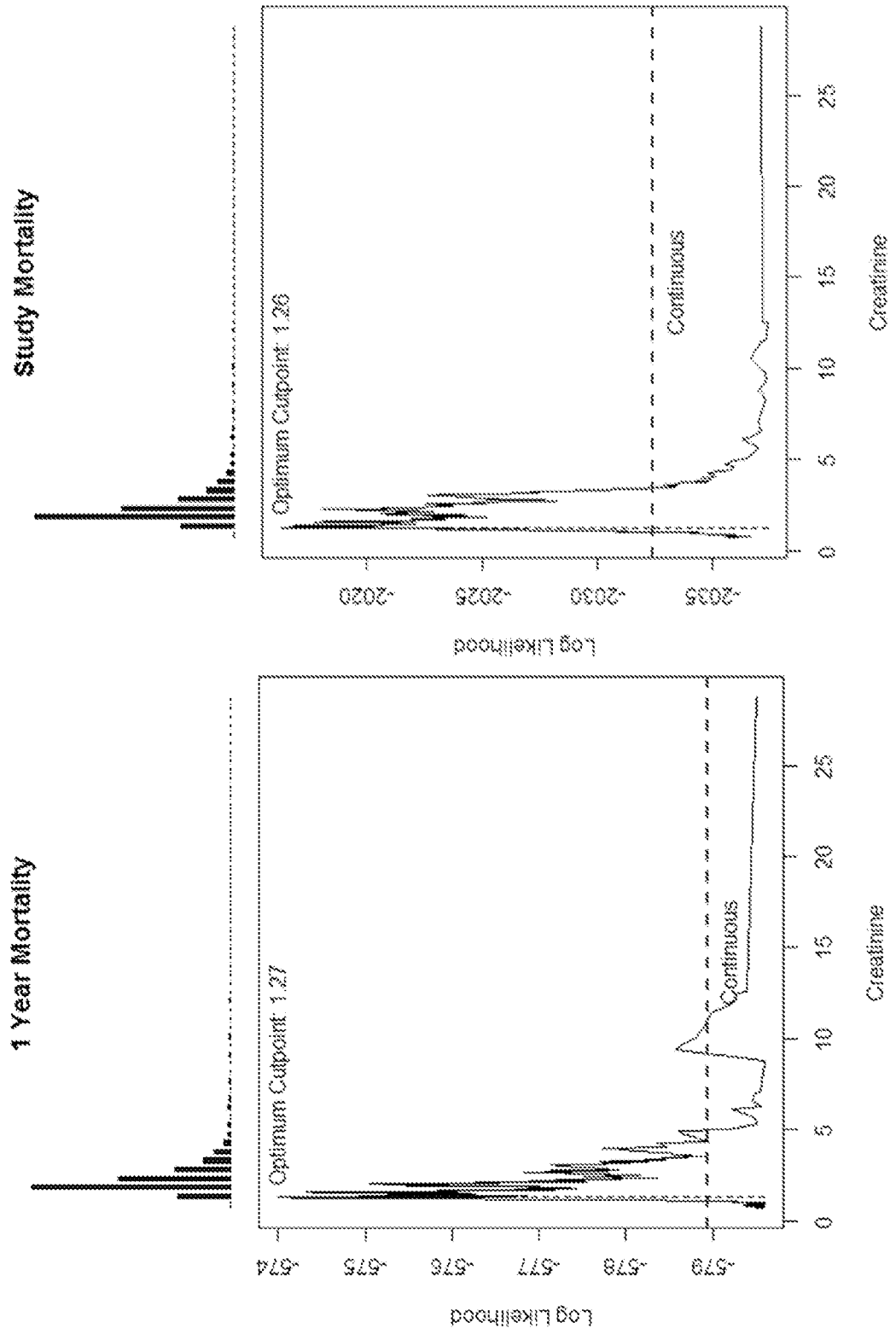


Fig. 9 Linearity Check: eGFR

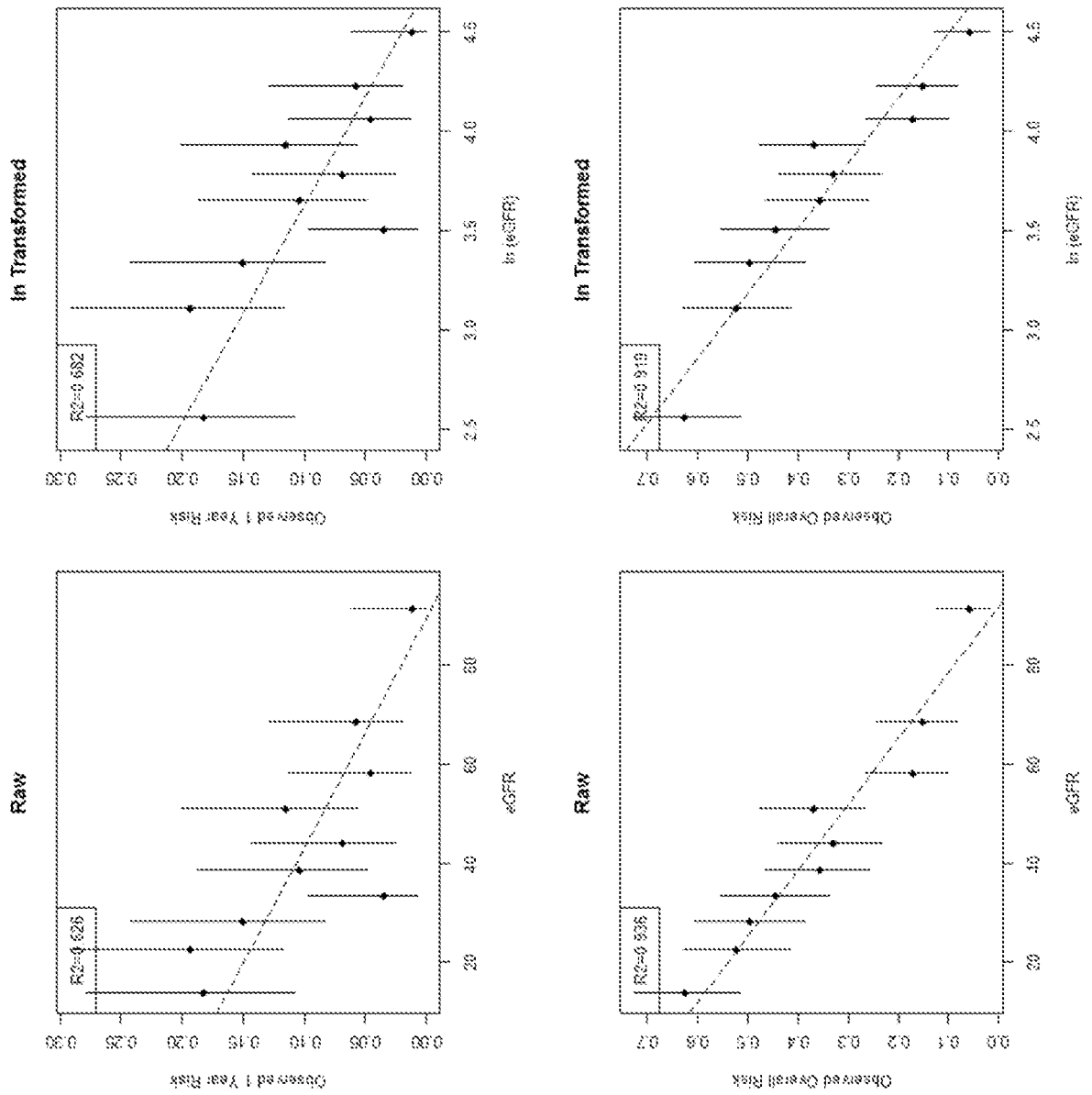


Fig. 10 Cut-Point Evaluation eGFR

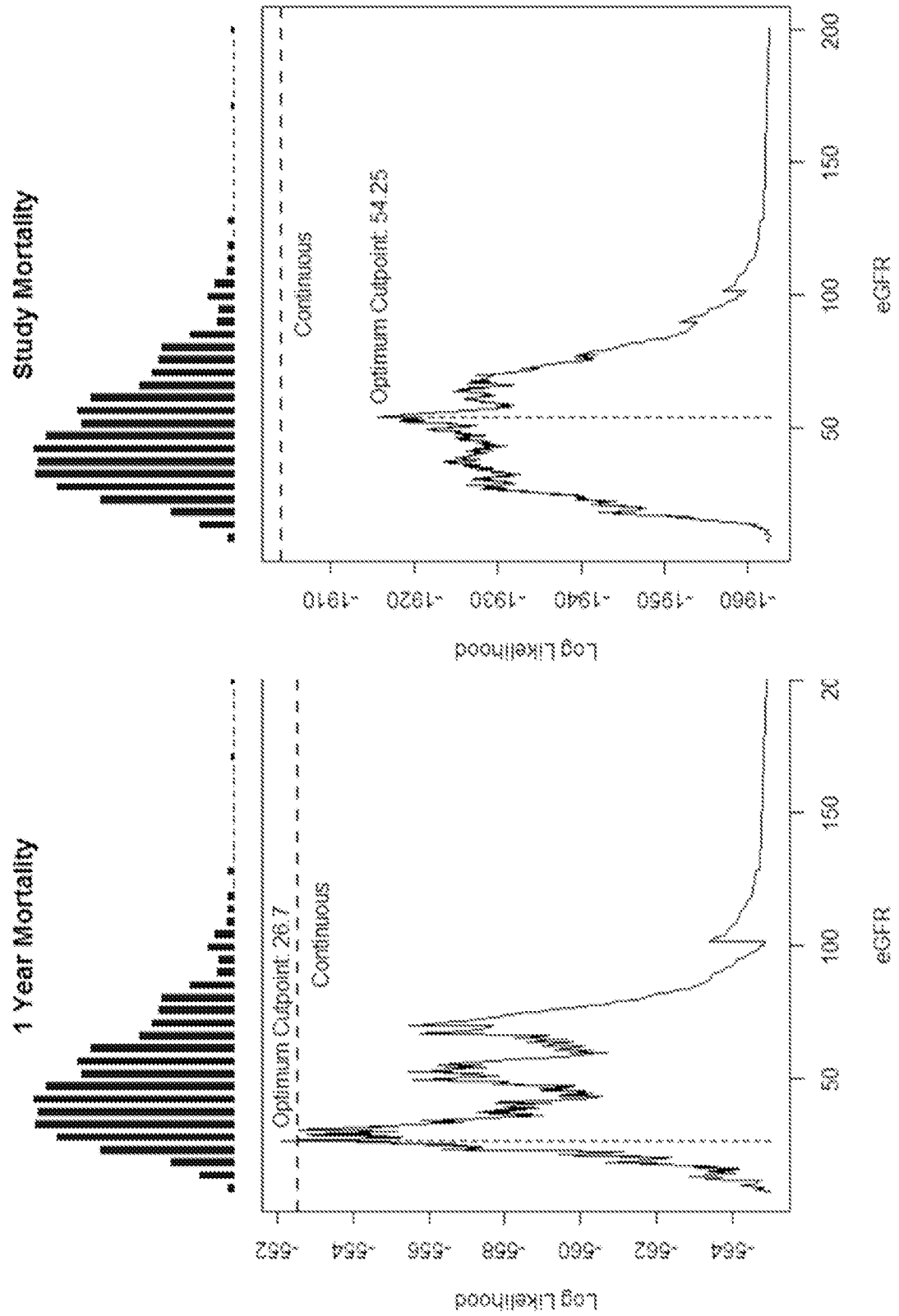


Fig. 11 Linearity Check: SBP

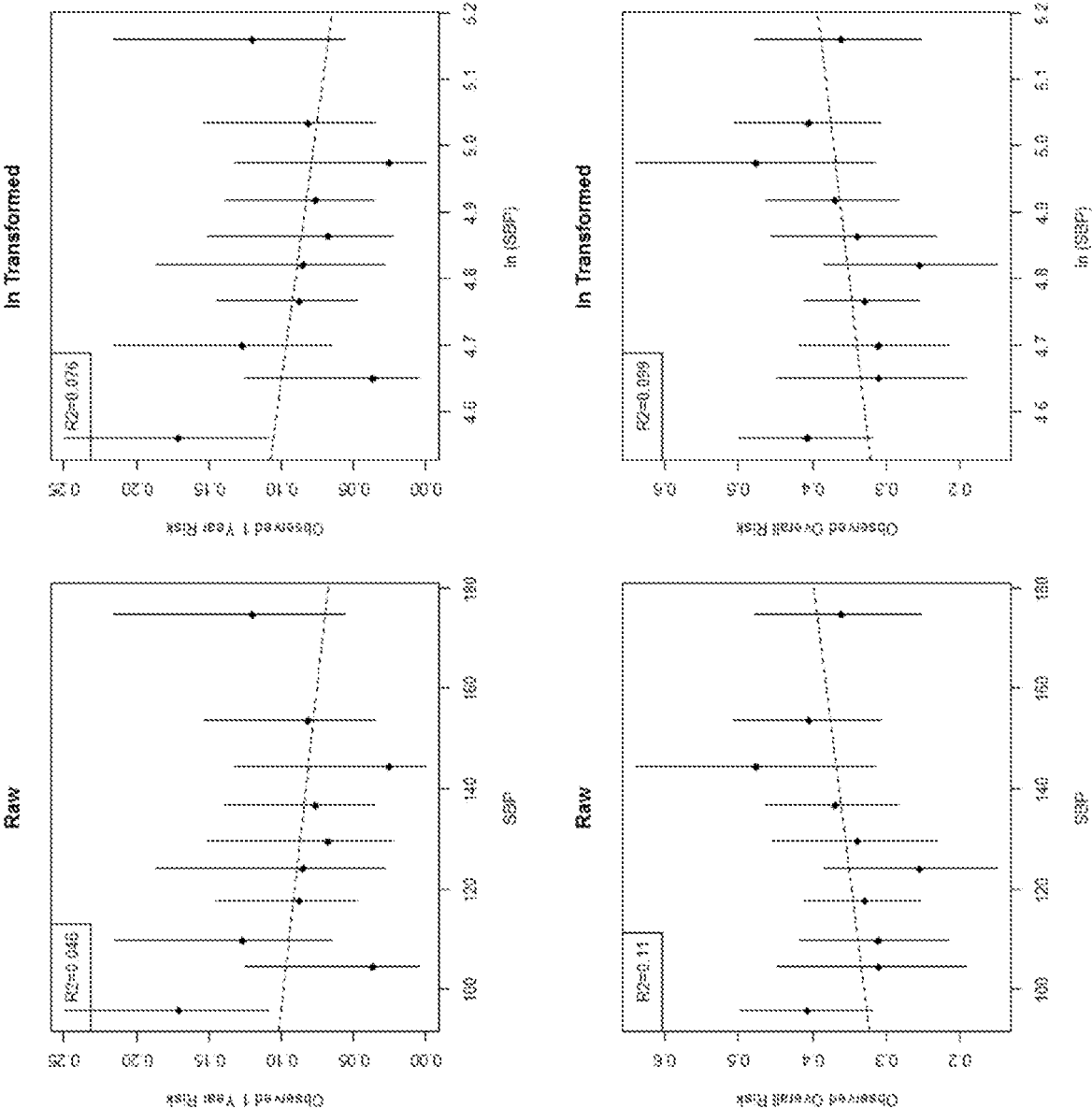


Fig. 12 Cut-Point Evaluation SBP

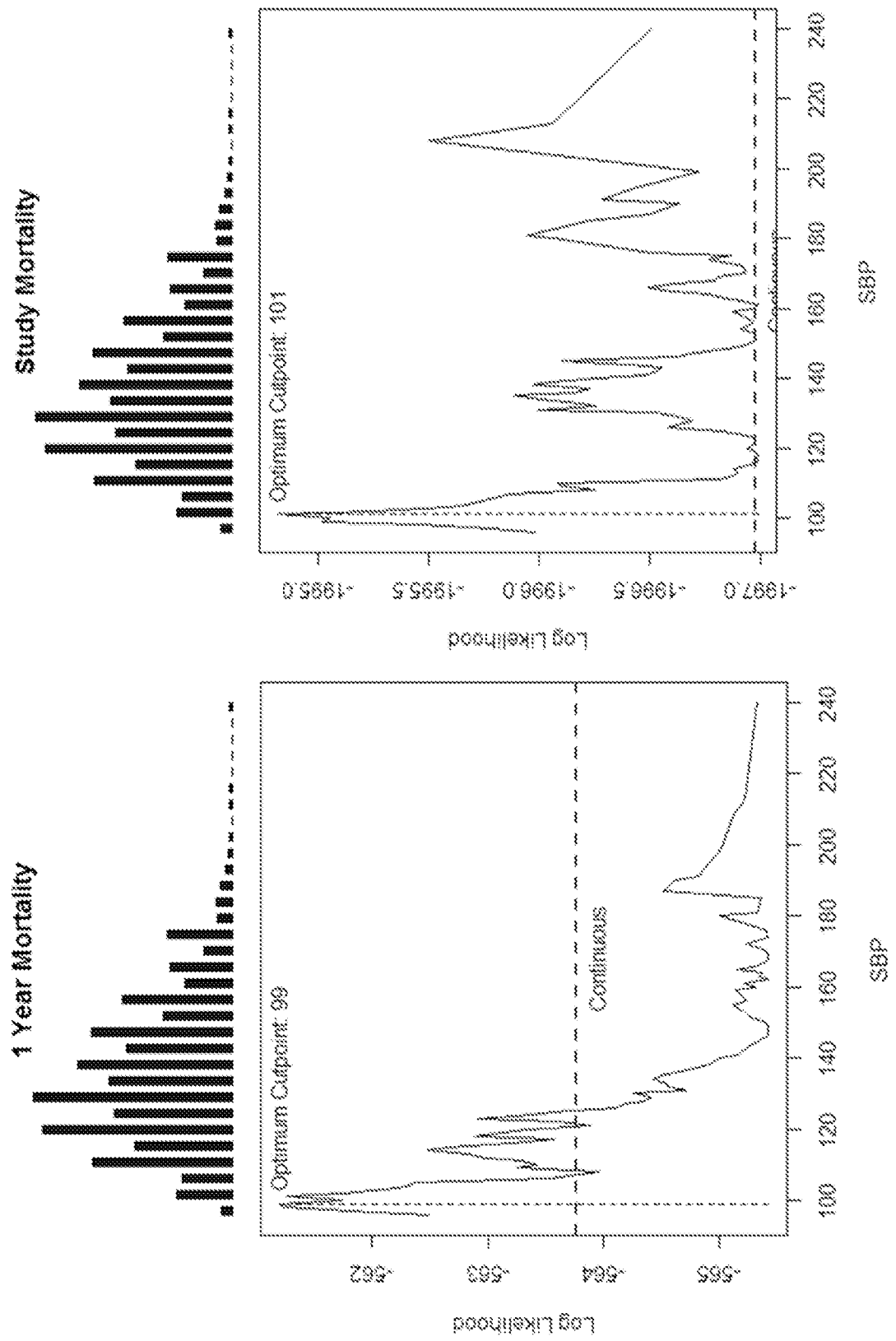


Fig. 13 Linearity Check: DBP

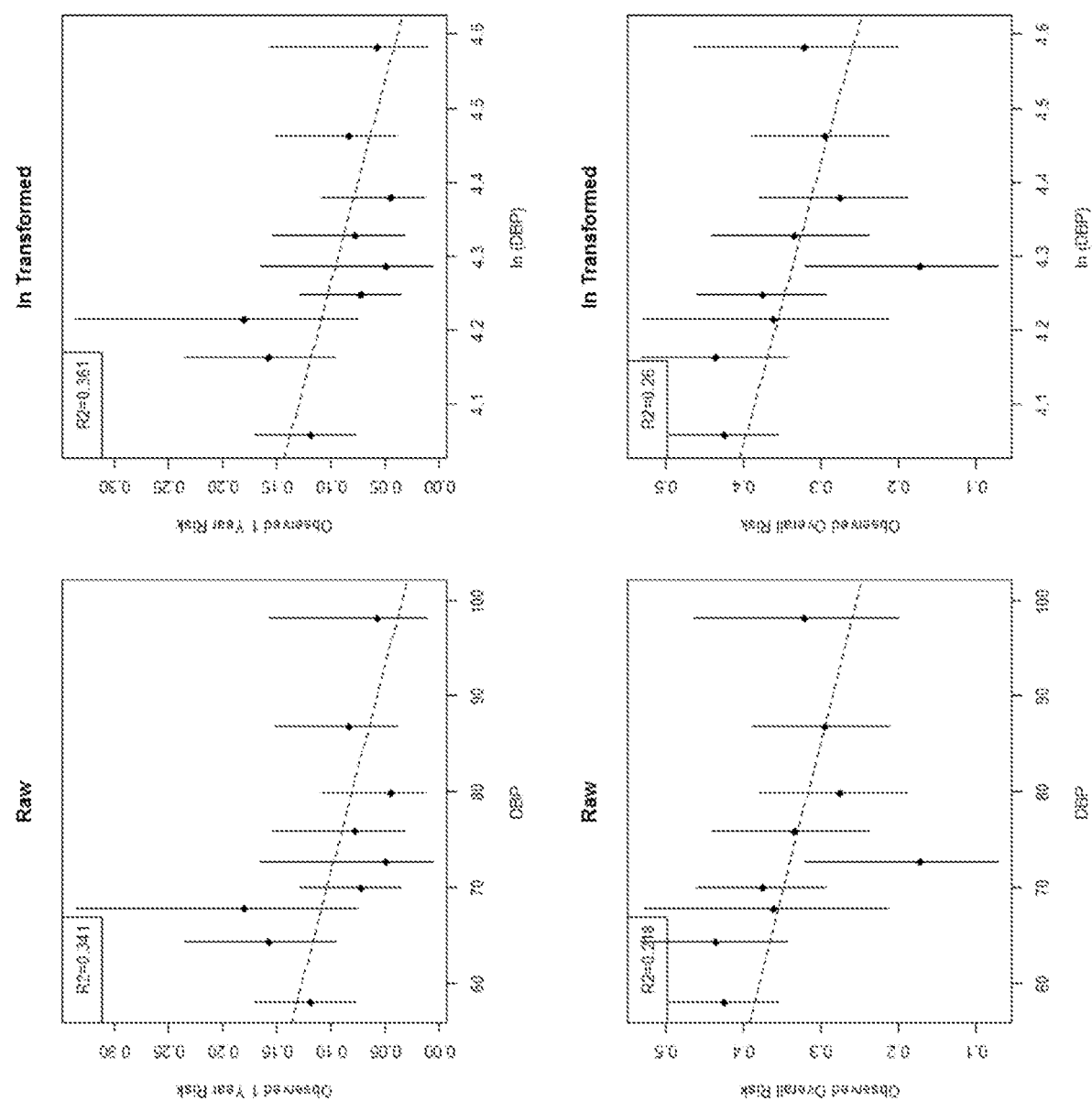


Fig. 14 Cut-Point Evaluation DBP

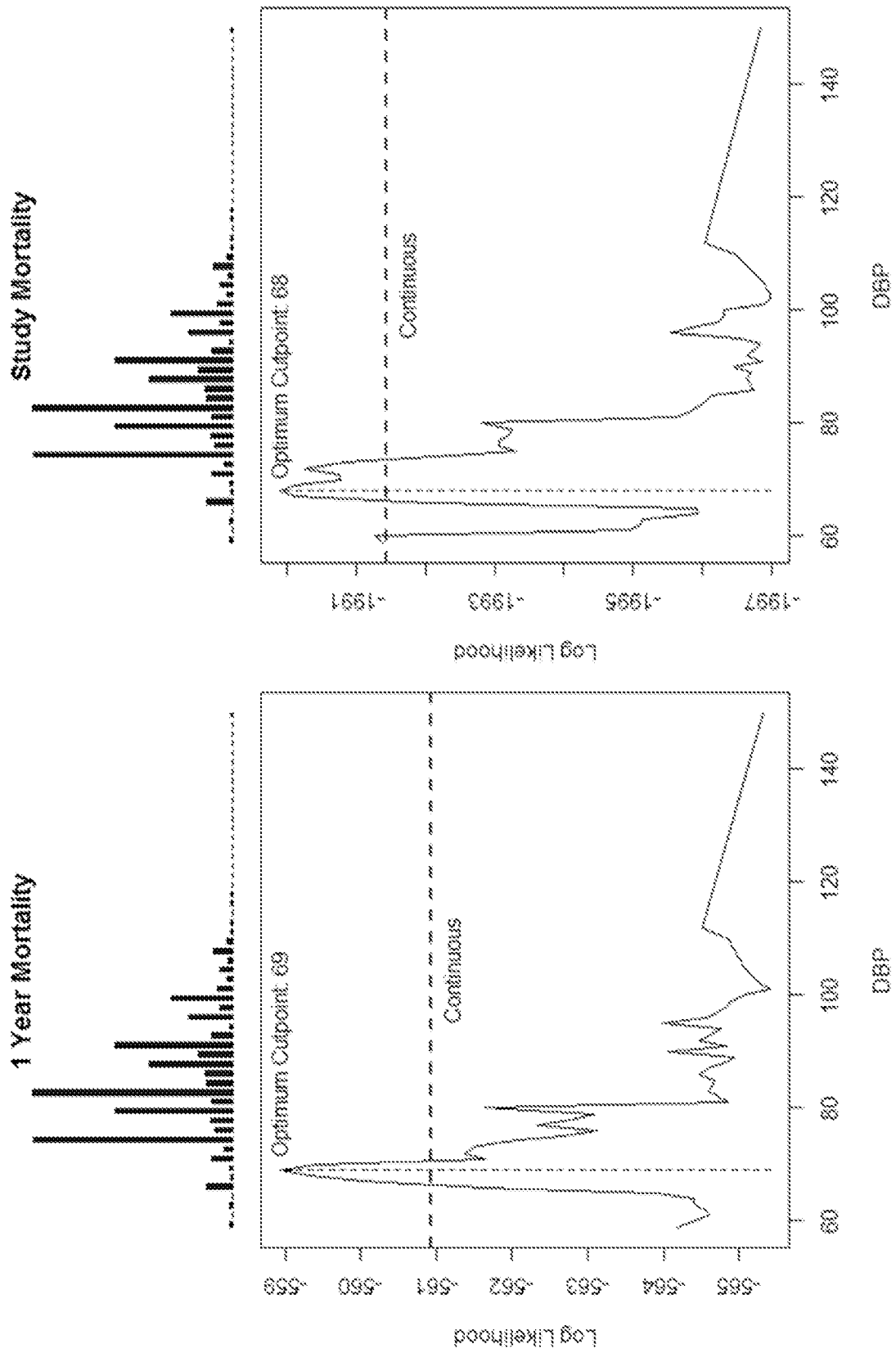


Fig. 15 Linearity Check: Hgb

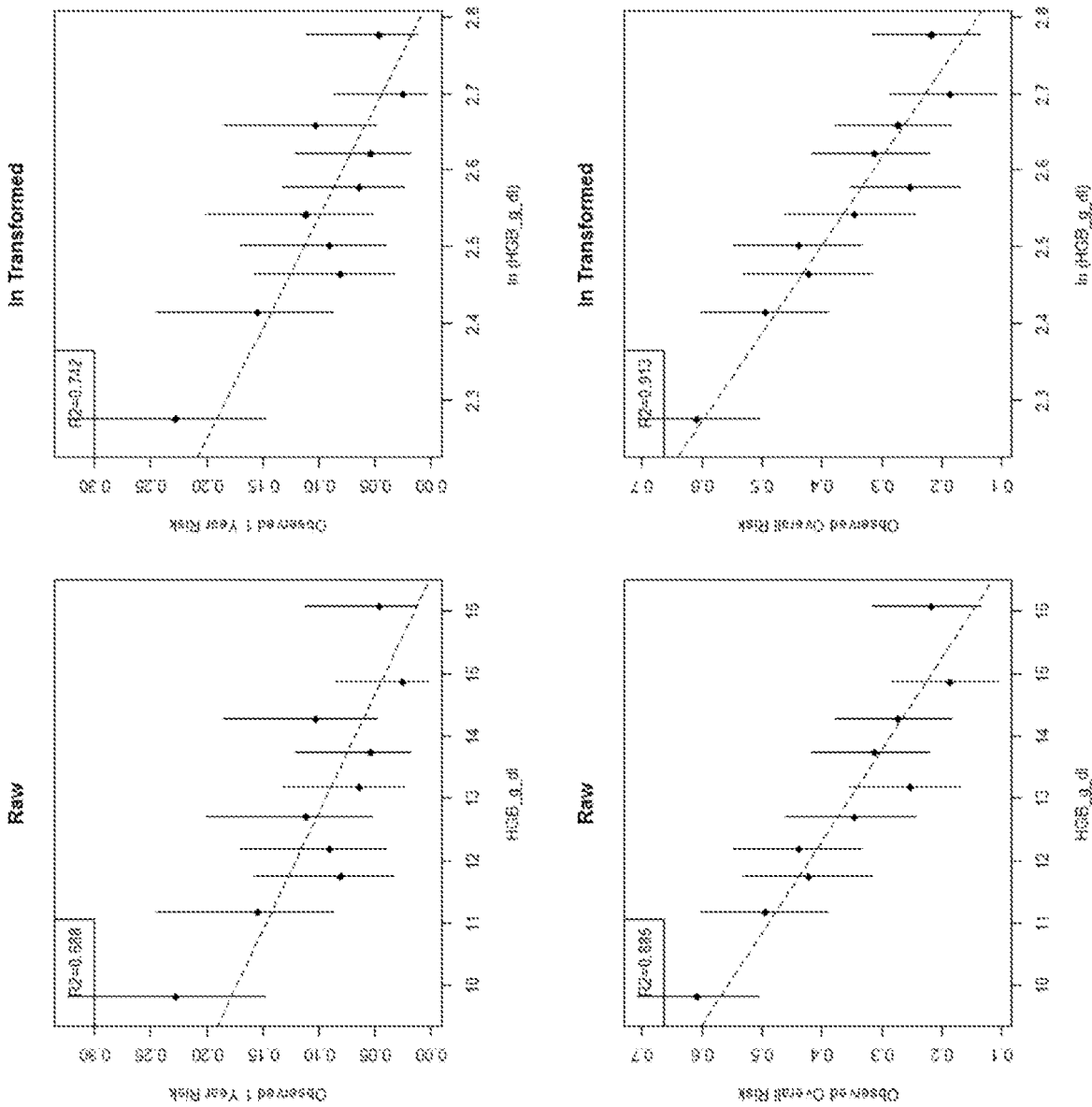


Fig. 16 Cut-Point Evaluation Hgb

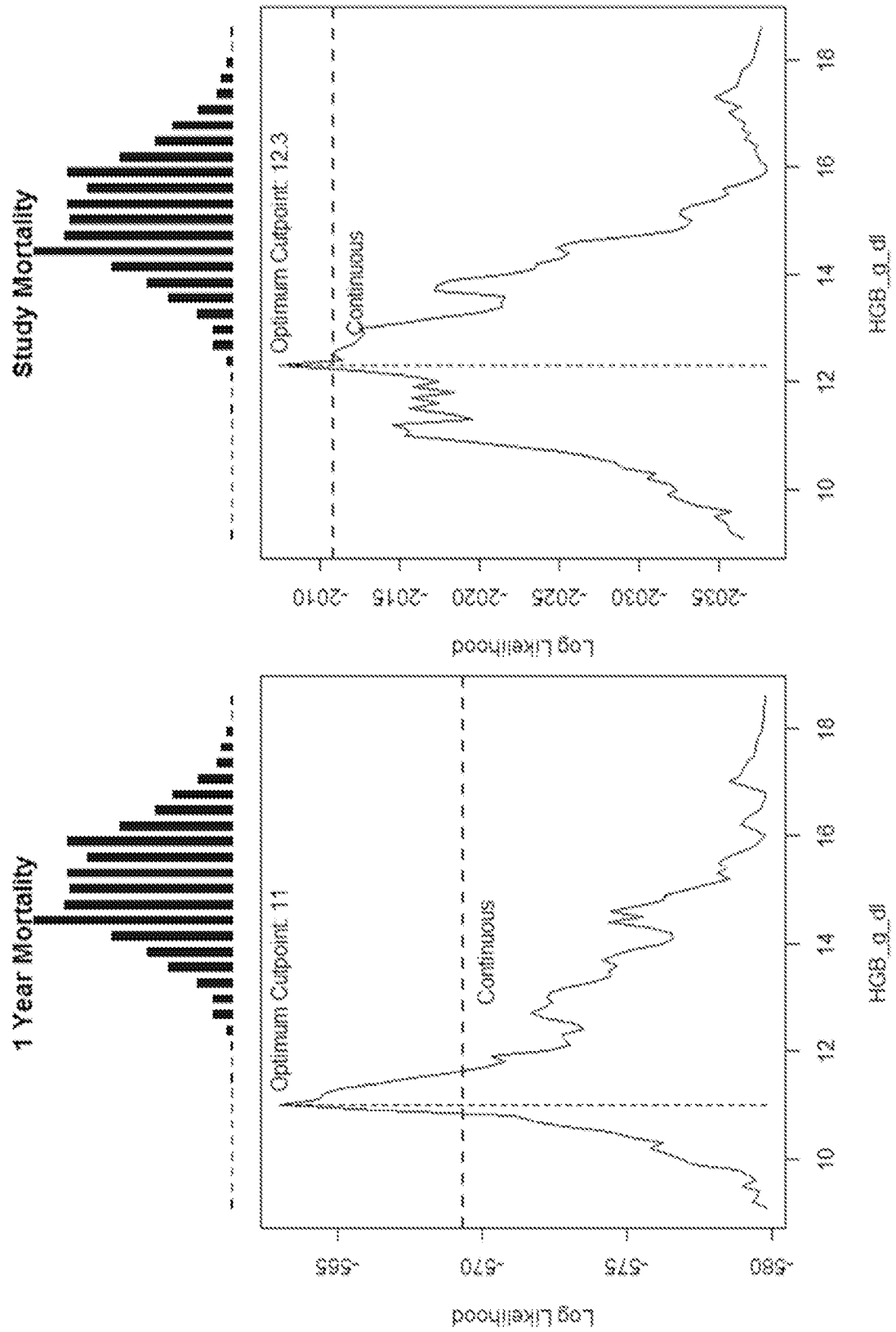


Fig. 17 Linearity Check: Age

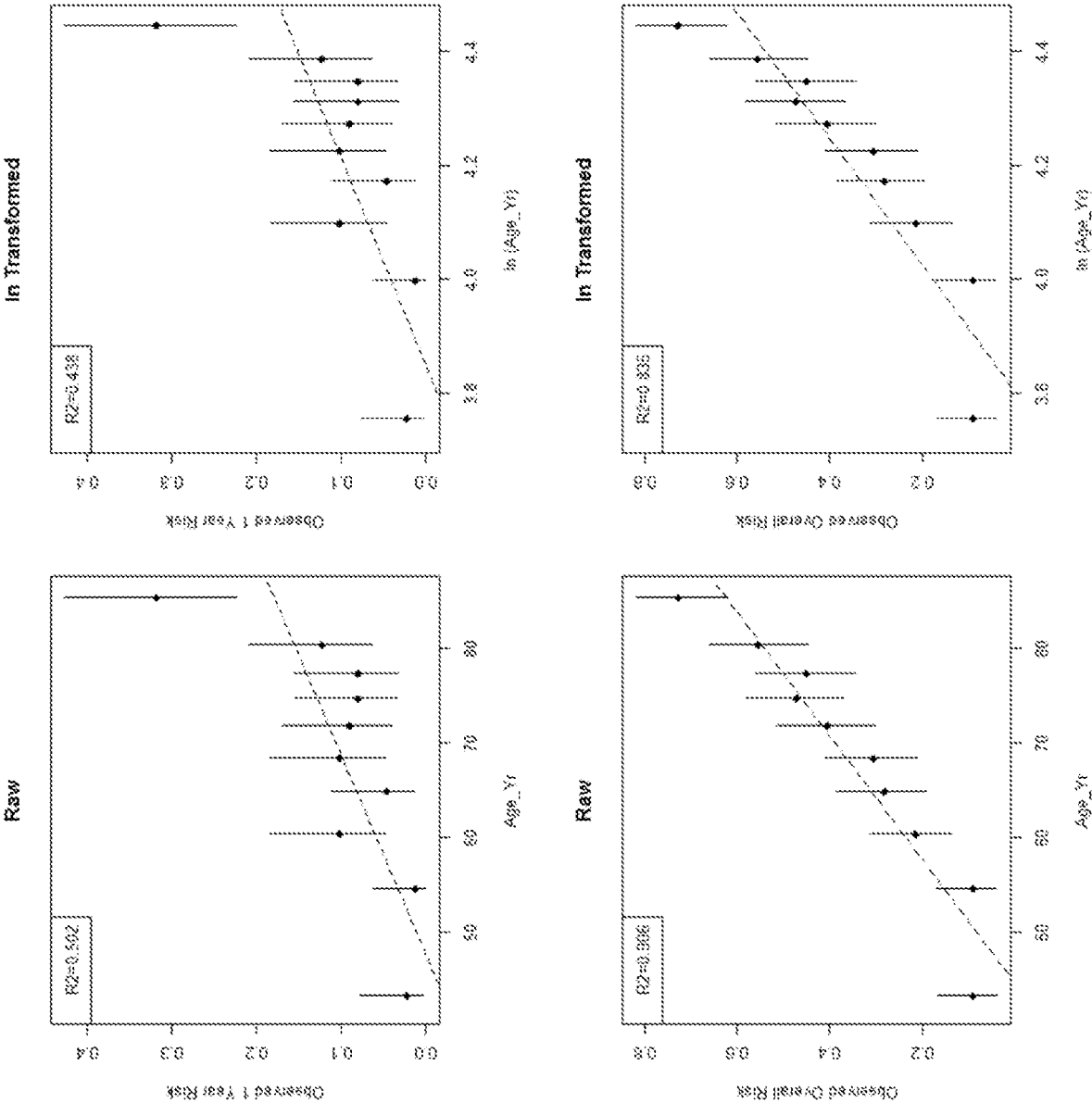


Fig. 18 Cut-Point Evaluation Age

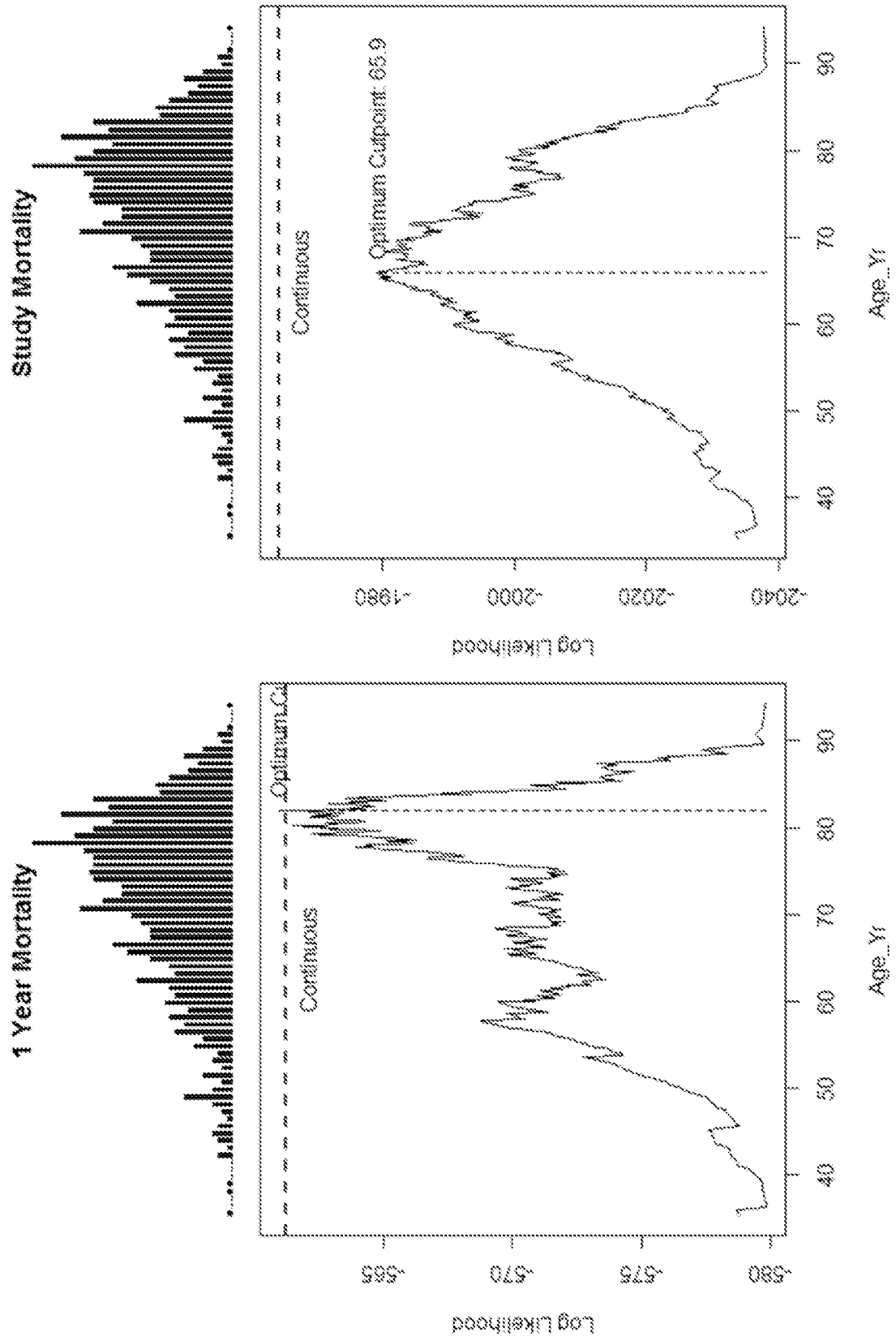


Fig. 19 Linearity Check: ST2

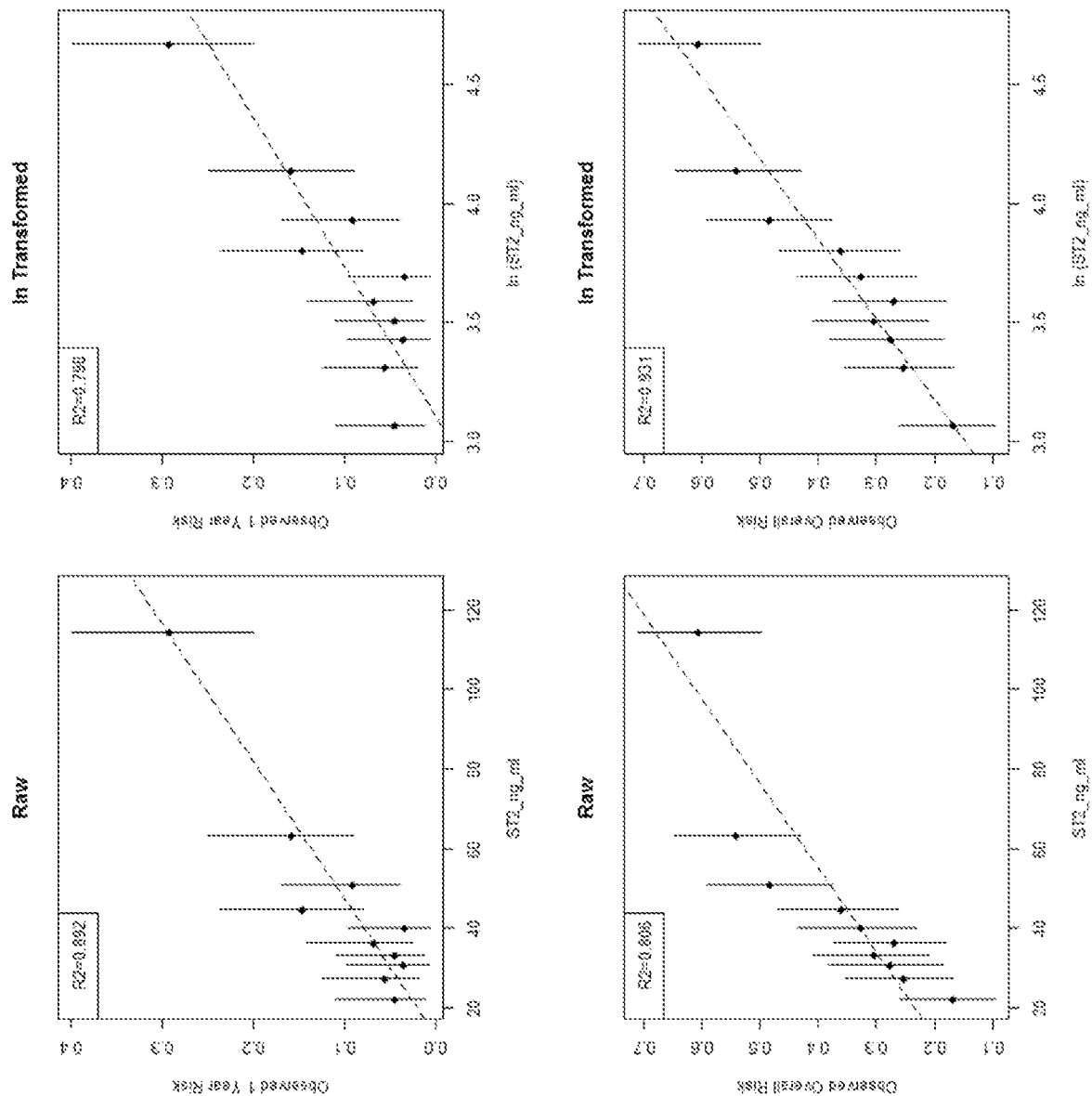


Fig. 20 Cut-Point Evaluation ST2

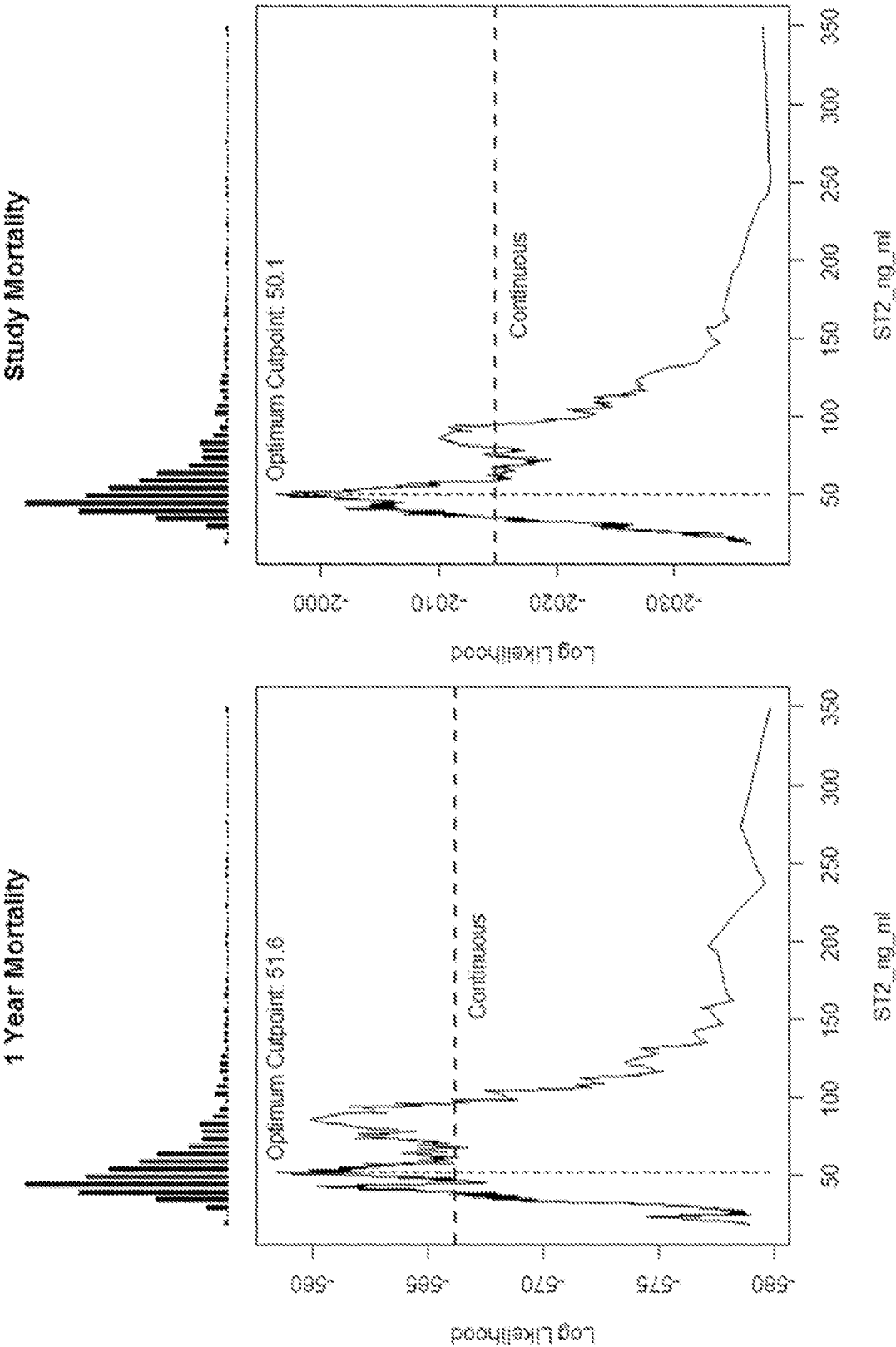


Fig. 21 Linearity Check: LVEF

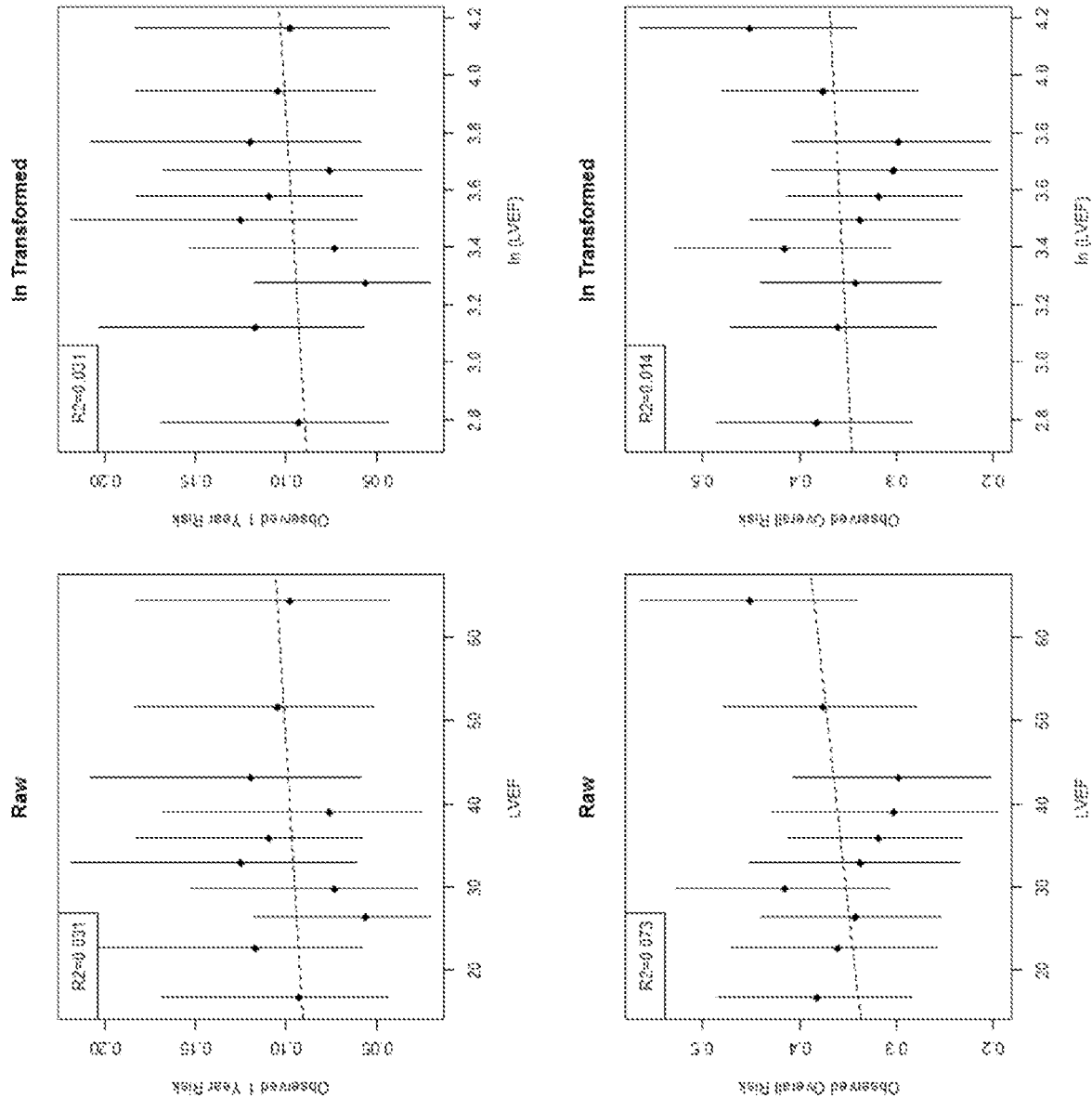


Fig. 22 Cut-Point Evaluation LVEF

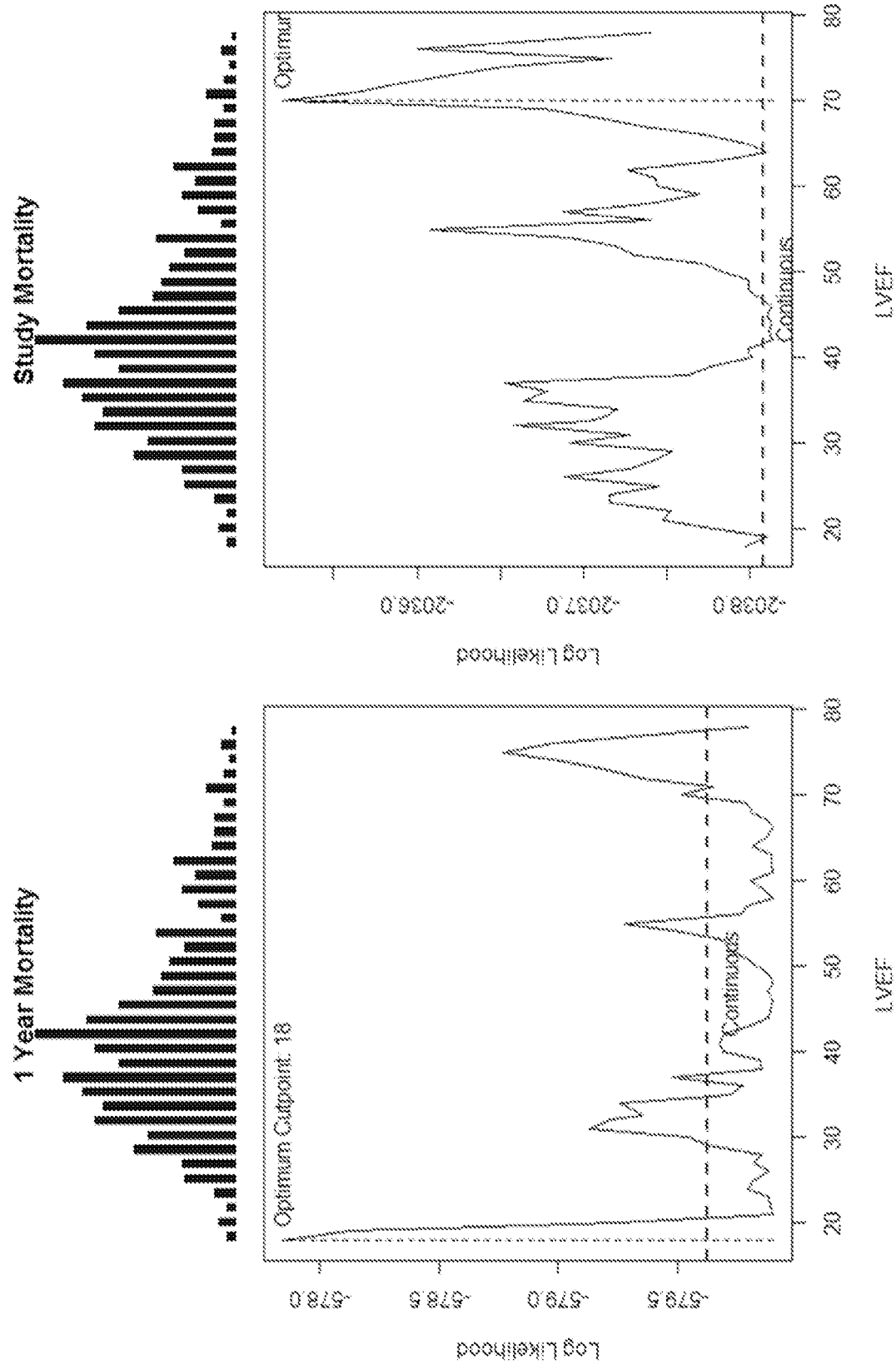


Fig. 23 Linearity Check: BMI

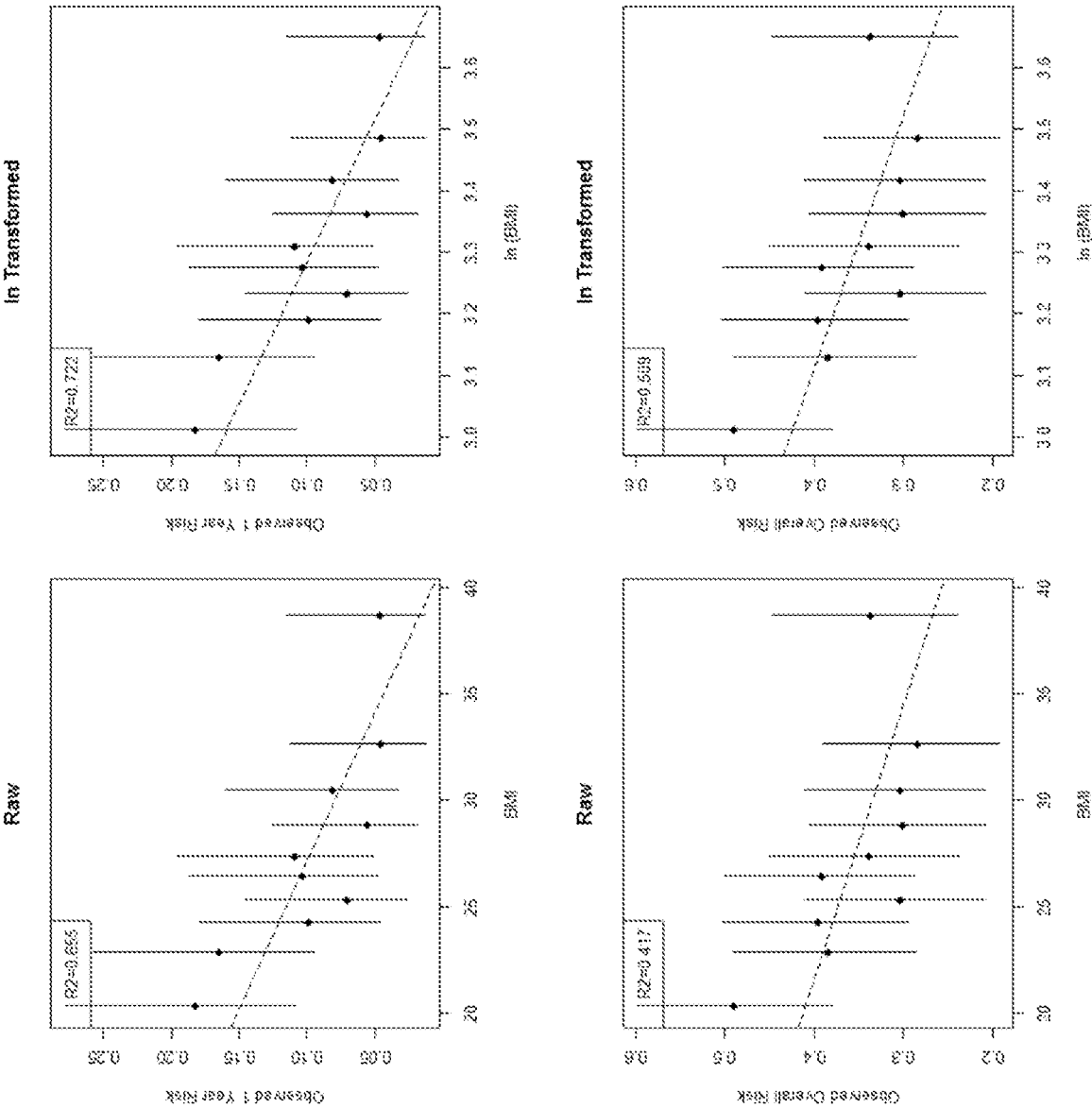


Fig. 24 Cut-Point Evaluation BMI

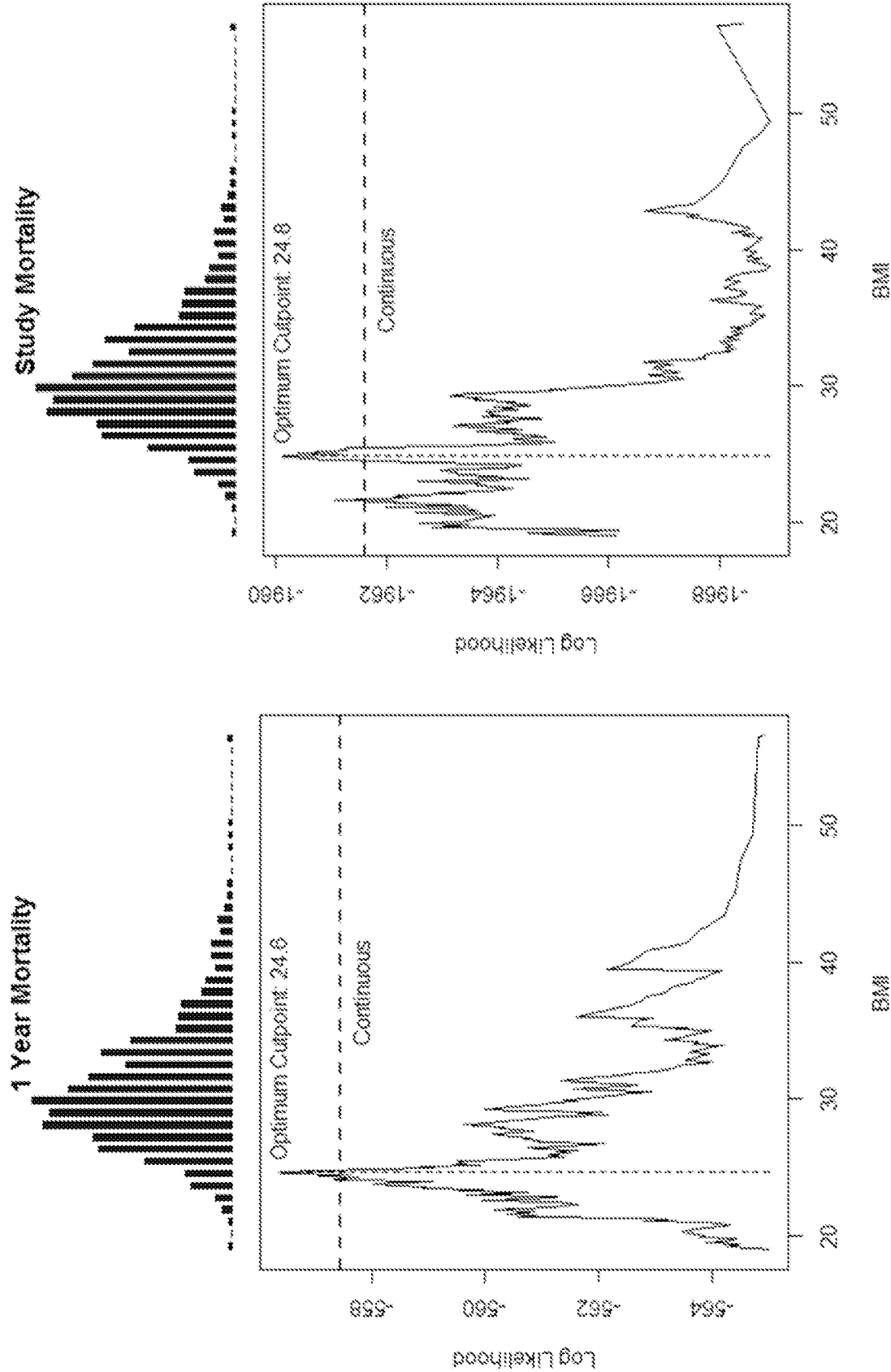


Fig. 25 Summary of Results

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

Markers Not Selected:	LVEF	Sex
Ln (eGFR)	NT-proBNP>=1700	Hypertension
SBP	GFR<50	
DBP	ST2 >= 35	

Standardized Hazard Ratios										Model Fit			Discrimination			
Model No	ST2		Troponin	BMI			InNTpro	InHGB	Diabetes	logLik	AIC	BIC	AUC	bsAUC	LCI	UCI
	Age_Yr	ST2	ST2.3g	NYHAgte3	SBPgt120	CAD										
13488	5	1.66	1.48	1.53	1.29	0.85	0.81	0.99	1.18	-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	1.30	0.78	1.16	0.99	1.18	-534.0	1077.9	1101.9	0.801	0.792	0.731	0.854
16189	5	1.69	1.47	1.50						1.36	-533.2	1076.4	1100.3	0.800	0.792	0.728
16825	5	1.61	1.42	1.46	1.32	0.87	1.64	1.16	1.16	-533.8	1077.7	1101.6	0.795	0.792	0.725	0.859
13506	5	1.64	1.54	1.57	1.34	0.78	1.64	1.16	1.16	-533.3	1076.6	1100.6	0.799	0.792	0.713	0.871
3524	4	1.65	1.57	1.57	1.34		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	1.53	1.16	1.16	-533.1	1076.2	1100.1	0.798	0.789	0.732	0.847
11372	5	1.62	1.45	1.43	1.32	0.78	1.43	1.16	1.16	-531.3	1072.6	1096.5	0.804	0.789	0.715	0.863
16650	5	1.84	1.48	1.46	1.22		1.22	-532.1	1074.2	1098.2	0.797	0.789	0.723	0.855		

Fig. 28 Top 10 3 Parameter Models
1 Year Outcome

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

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

Forward Selection				Stepwise Selection			
HR	95% CI	P		HR	95% CI	P	
In (Troponin)	1.43	1.11-1.84	0.0053				
In (ST2)	2.26	1.51-3.38	<0.0001	In (Troponin)	1.43	1.11-1.84	0.0053
Age	1.05	1.02-1.07	0.0002	In (ST2)	2.26	1.51-3.38	<0.0001
NYHA>=3	1.69	1.07-2.65	0.0239	Age	1.05	1.02-1.07	0.0002
In (HGB)	0.27	0.07-1.02	0.0535	NYHA>=3	1.69	1.07-2.65	0.0239
BMI>=25	0.63	0.41-0.98	0.0408	In (HGB)	0.27	0.07-1.02	0.0535
SBP<120	1.46	0.93-2.28	0.0977	BMI>=25	0.63	0.41-0.98	0.0408
Diabetes	1.6	1.01-2.53	0.047	SBP<120	1.46	0.93-2.28	0.0977
CAD	0.68	0.44-1.06	0.0855	Diabetes	1.6	1.01-2.53	0.047
Hypertension	0.67	0.41-1.07	0.0942	CAD	0.68	0.44-1.06	0.0855
				Hypertension	0.67	0.41-1.07	0.0942

Fitted AUC:0.821

bsAUC: 0.751 [0.677-0.824]

1 Year Outcome

Fitted AUC:0.818

bsAUC: 0.751 [0.677-0.824]

Fitted AUC:0.818

bsAUC: 0.751 [0.677-0.825]

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	Troponin			Model Fit				Discrimination								
		Age_Yr	ST2gte50	NYHAge3	IneGFR	InHGB	InCreat	SBP	CAD	HTN	logLik	AIC	BIC	AUC	bsAUC	LCI	UCI
16776	5	1.67	1.39	1.34	1.65												
16581	5	1.60	1.37	1.35	1.65	0.89	0.84										
16692	5	1.71	1.36	1.30		1.54	0.85										
17095	5	1.69	1.38	1.35	1.70			0.98									
13616	5	1.68	1.38	1.36	1.70				1.01								
16317	5	1.68	1.37	1.36	1.64			1.13									
3526	4	1.72	1.36	1.33		1.59											
3610	4	1.68	1.38	1.36	1.70												
16497	5	1.66	1.35	1.33		1.55	0.92										
15971	5	1.70	1.38	1.36	1.71					0.94							

Markers Not Selected: LVEF

Ln (NT-proBNP)

DBP

Ln (ST2)

SBP<120

ST2>=35

ST2 3 Group

BMI >=25

Sex

Diabetes

Fig. 32 Top 10 3 Parameter Models
Study Outcomes

		ST2	Trponin		Model Fit	Discrimination					
Model No	K	ST2gte50	TROPONINgte16	NYHAgte3	logLik	AIC	BIC	AUC	bsAUC	LCI	UCI
514	3	1.73	1.81	1.36	-1904.8	3815.6	3830.0	0.799	0.797	0.763	0.831
513	3	1.89		1.42	-1913.0	3832.0	3846.4	0.799	0.795	0.757	0.832
511	3	1.90		1.39	-1914.0	3833.9	3848.3	0.794	0.794	0.756	0.832
477	3	1.90	1.44	1.38	-1915.8	3837.7	3852.0	0.798	0.794	0.754	0.833
488	3	1.85	1.39		-1900.2	3806.3	3820.7	0.793	0.793	0.754	0.831
531	3	1.82	1.38		-1903.2	3812.4	3826.7	0.795	0.792	0.755	0.829
490	3	1.84	1.35		-1901.2	3808.4	3822.8	0.796	0.791	0.751	0.831
484	3	1.79		1.31	-1903.2	3812.4	3826.7	0.797	0.791	0.754	0.828
529	3	1.83	1.43		-1903.1	3812.2	3826.6	0.793	0.790	0.757	0.824
481	3	1.83	1.36	1.74	-1904.7	3815.4	3829.8	0.794	0.790	0.744	0.836

Markers Not Selected:

Ln (NT-proBNP)

Ln Creatinine

Ln (eGFR)

SBP

DBP

Ln (Hgb)

LVEF

BMI

NT-proBNP >=1700

GFR<50

SBP<120

ST2 >= 35

BMI>=25

SEX

CAD

Diabetes

Hypertension

Fig. 33 Models Based on AIC
Study Outcome

Fitted AUC:0.808 bsAUC: 0.741 [0.665-0.816]				Fitted AUC:0.800 bsAUC: 0.743 [0.666-0.837]			
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:0.800 bsAUC: 0.744 [0.667-0.821]				Fitted AUC:0.800 bsAUC: 0.744 [0.667-0.821]			
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

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

Age is a component of eGFR



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

Fig. 36 Univariate Performance

Variable	Outcome=0	Outcome=1	Test	sOR(Raw)	LRT p	sOR(ln)	LRT p	AuROC
Age_Yr	Median [IQR] 73.5[61.5-81]	Median [IQR] 80[74-85]	P Value 0.001	Est [95% CI] 1.75 [1.25-2.55]	<0.001	Est [95% CI] 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

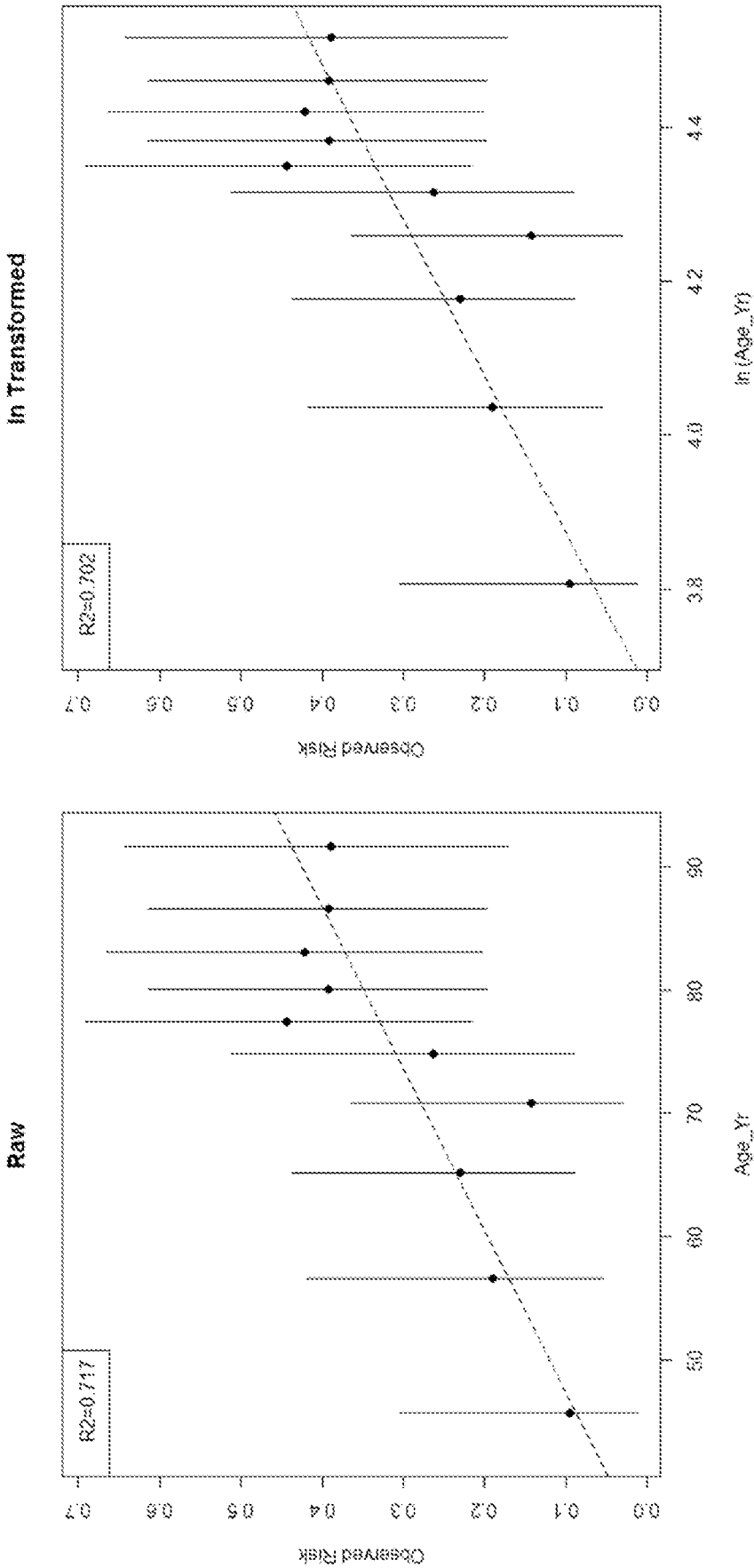


Fig. 38 Linearity Evaluation: SBP

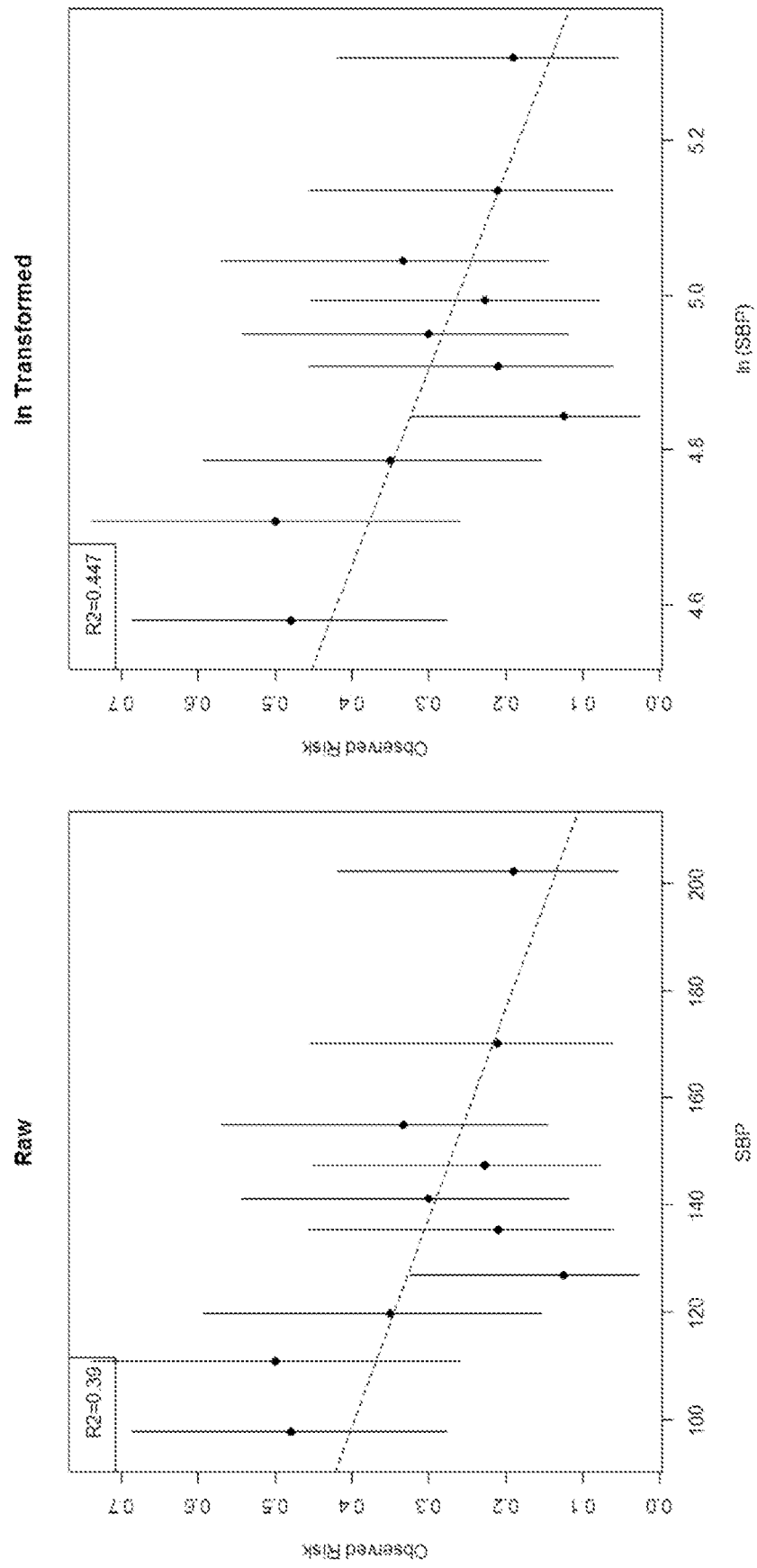


Fig. 39 Linearity Evaluation: DBP

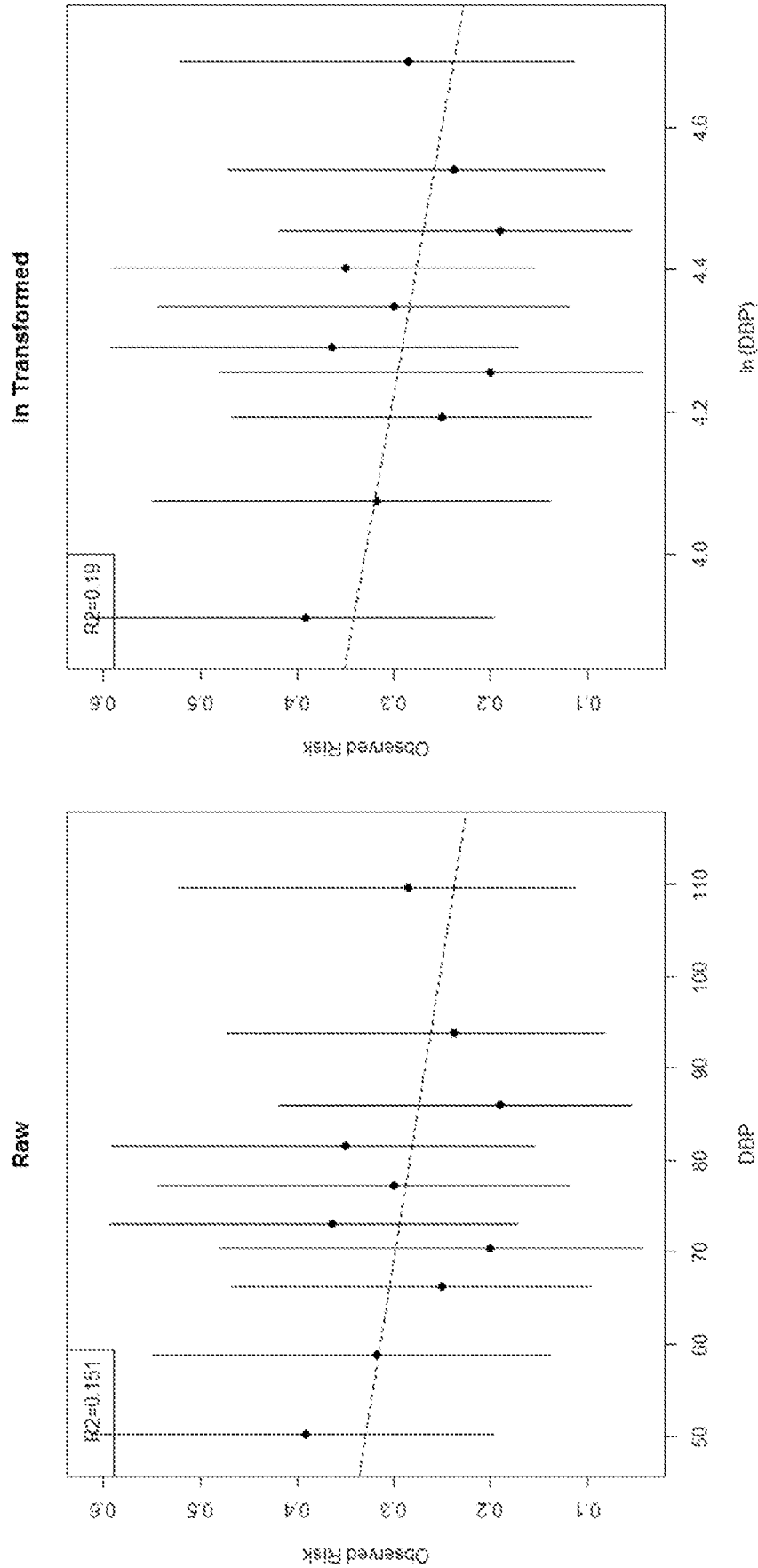


Fig. 40 Linearity Evaluation: BMI

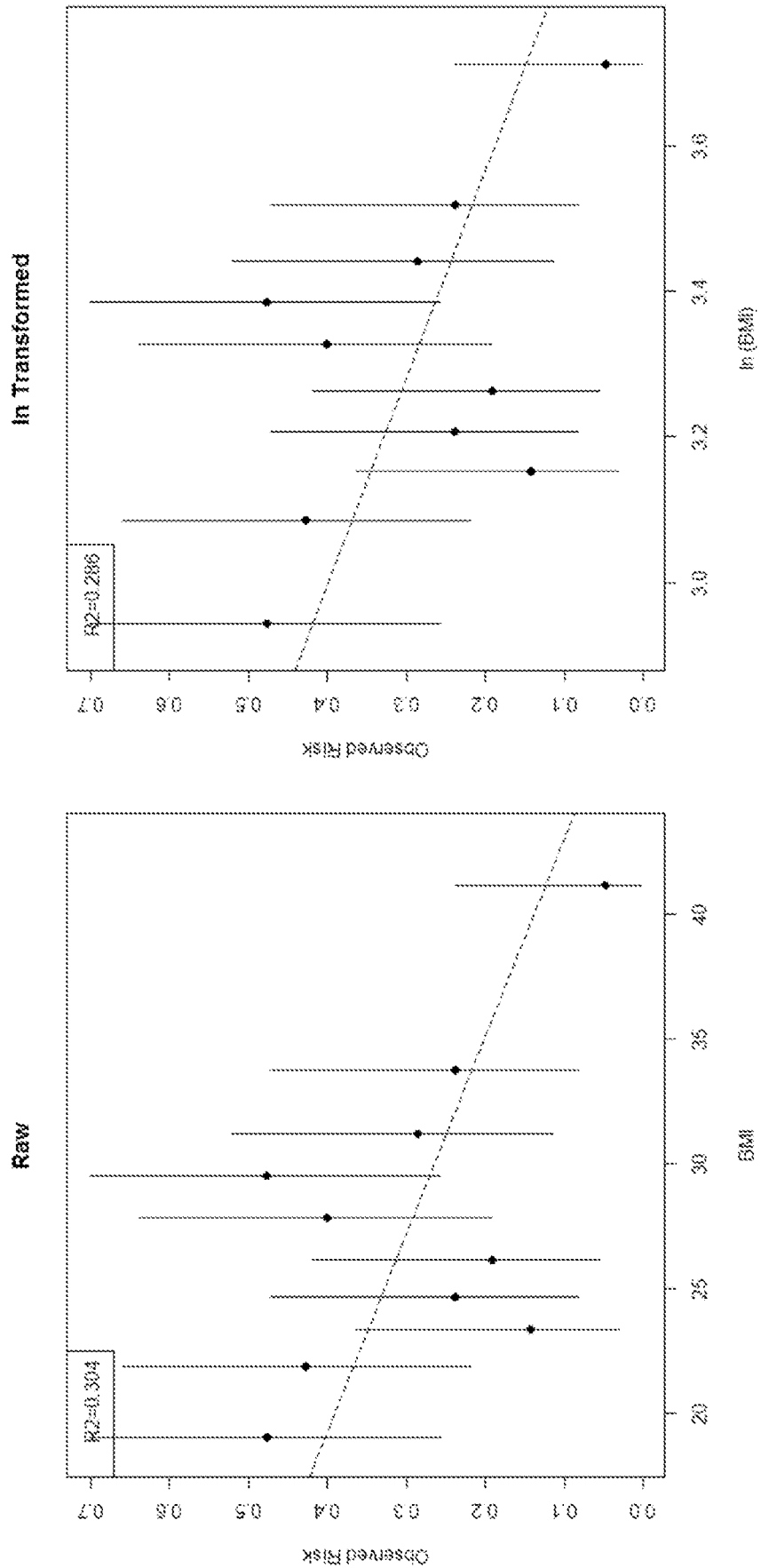


Fig. 41 Linearity Evaluation: LVEF

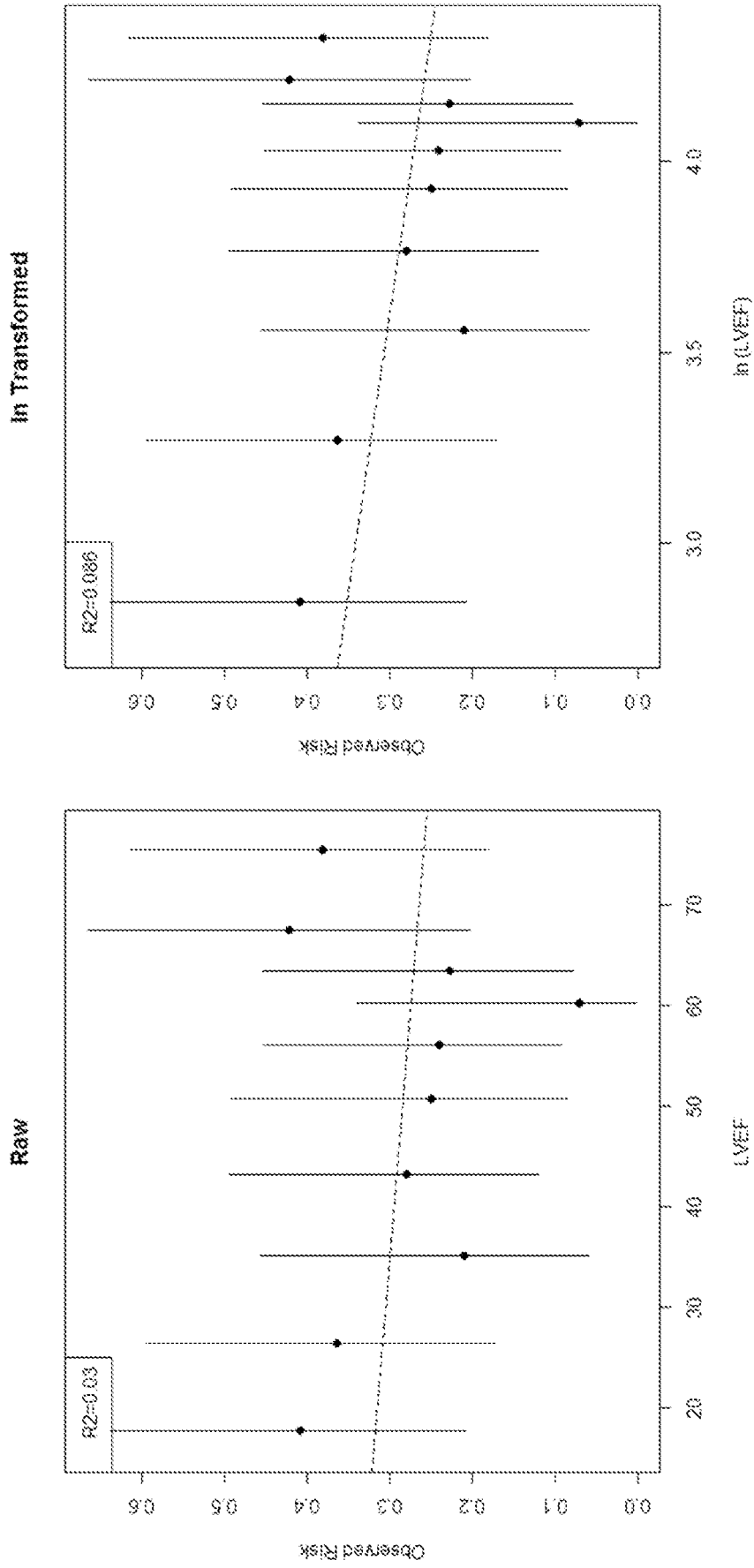


Fig. 42 Linearity Check: eGFR

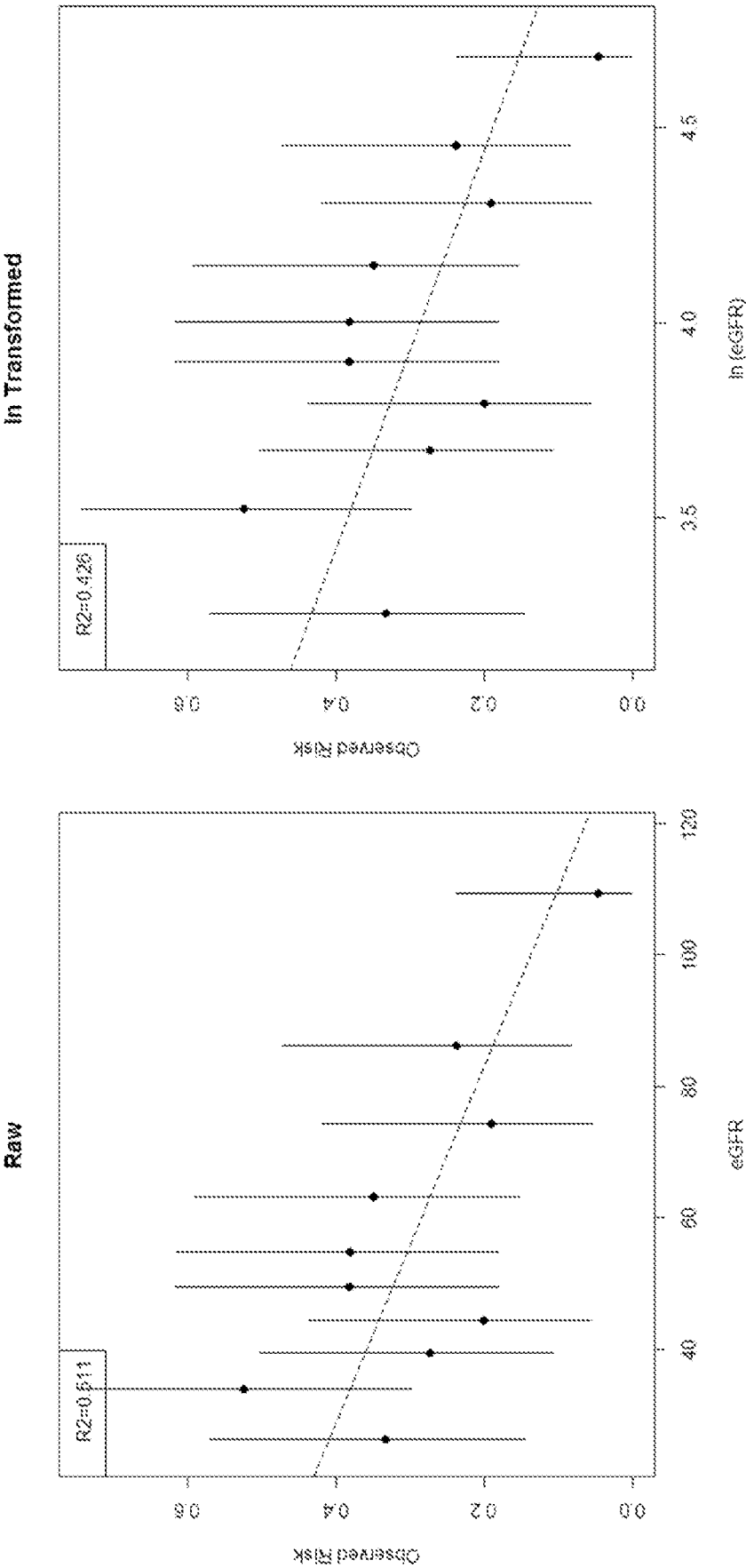


Fig. 43 Linearity Check: Creatinine

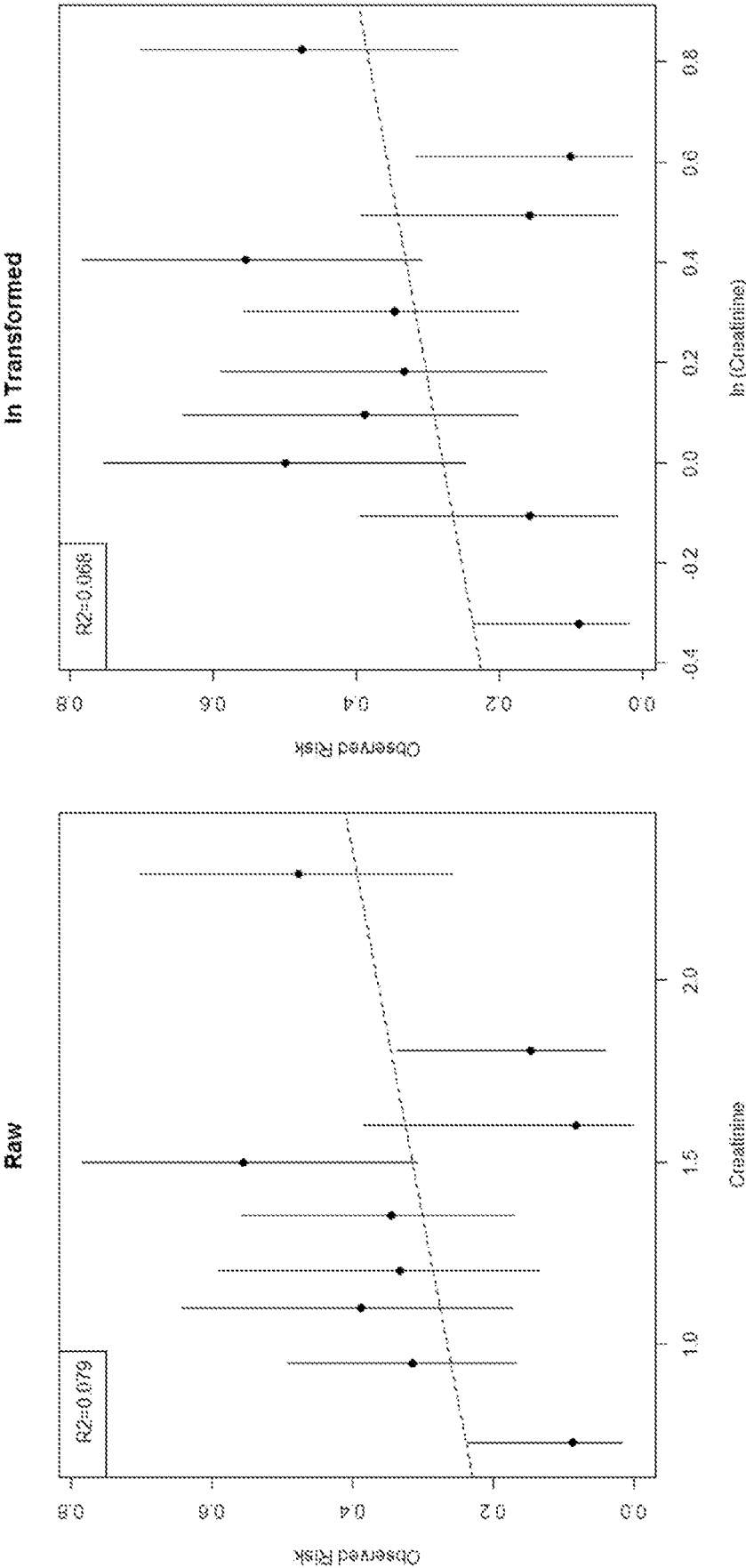


Fig. 44 Linearity Check: BUN

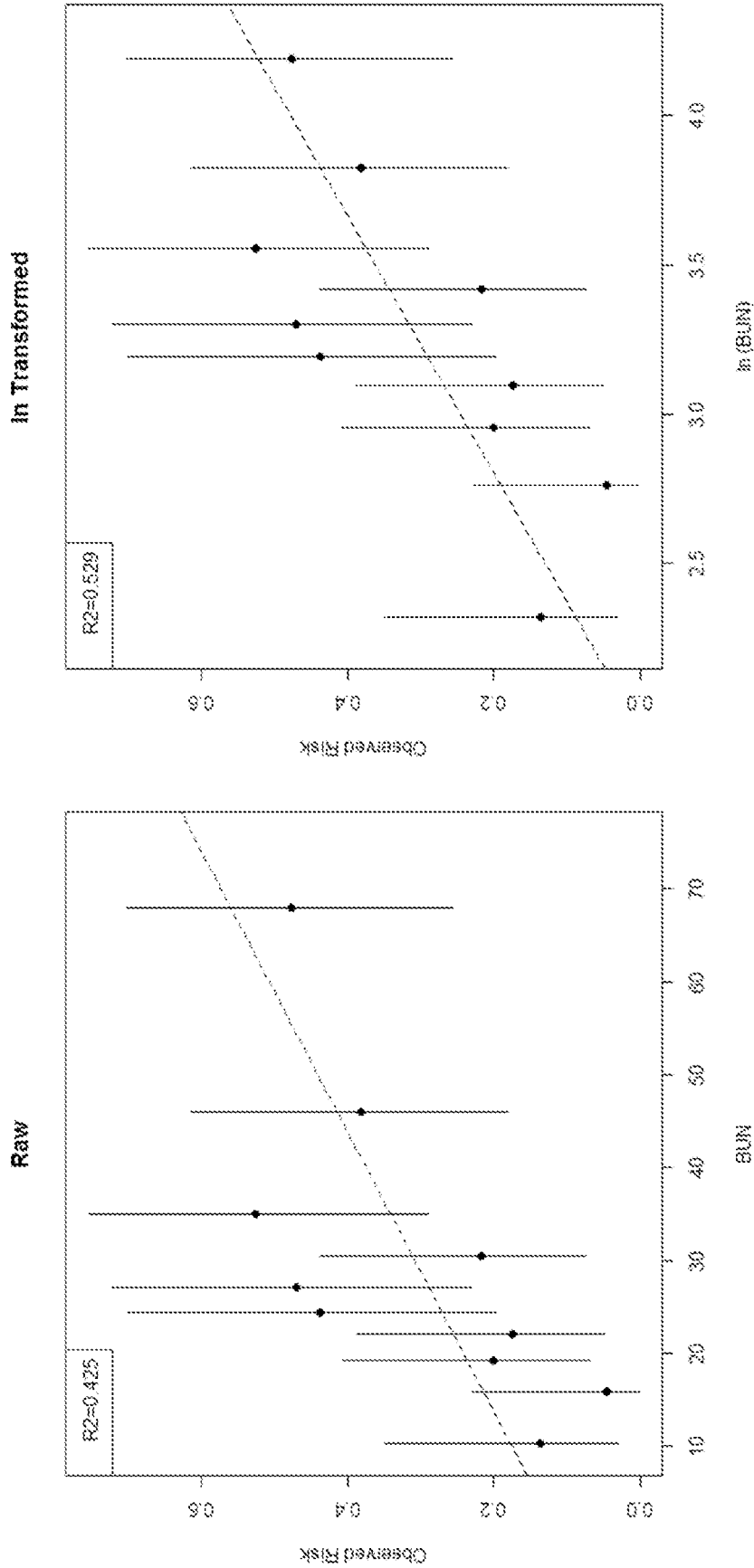


Fig. 45 Linearity Check: Hemoglobin

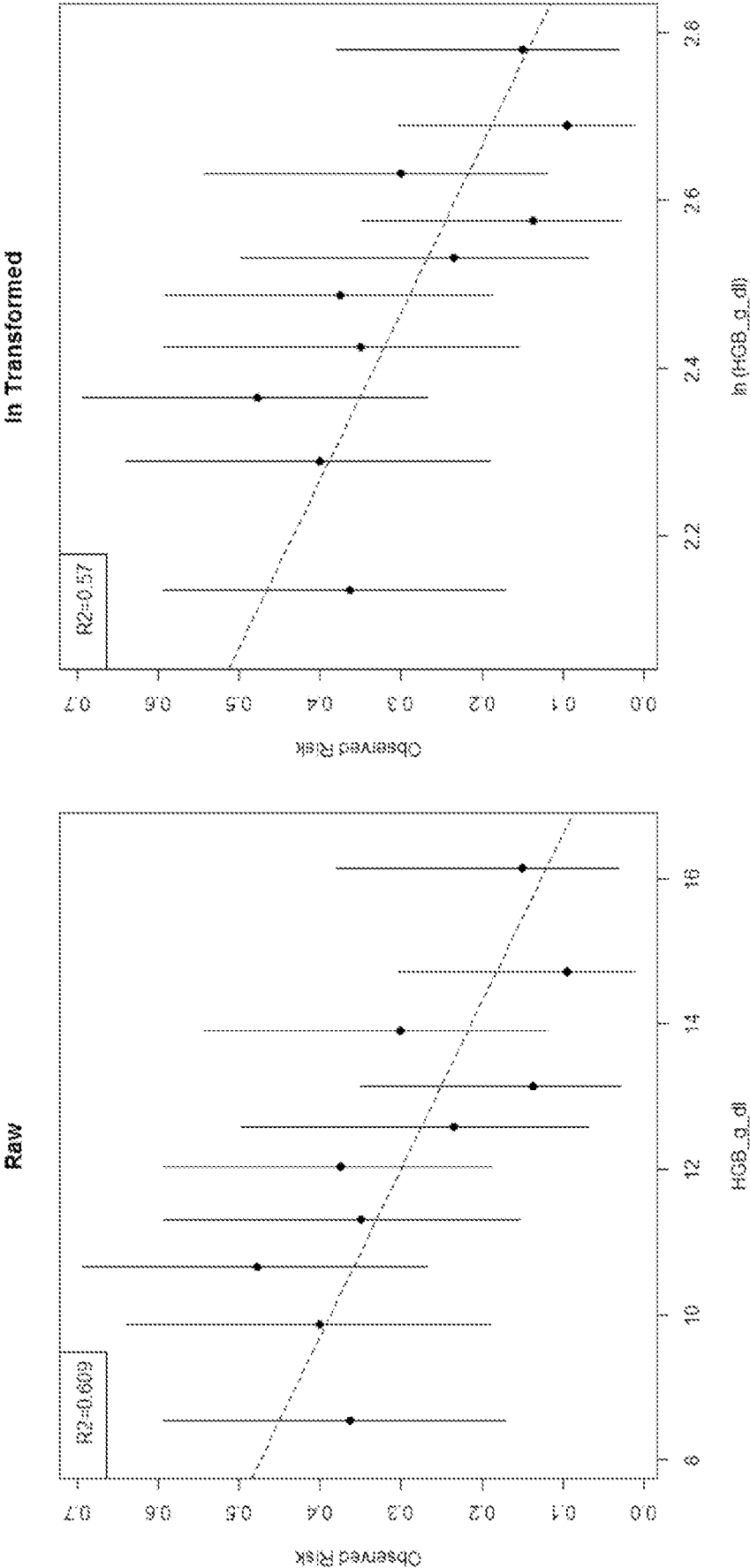


Fig. 46 Linearity Check: Troponin

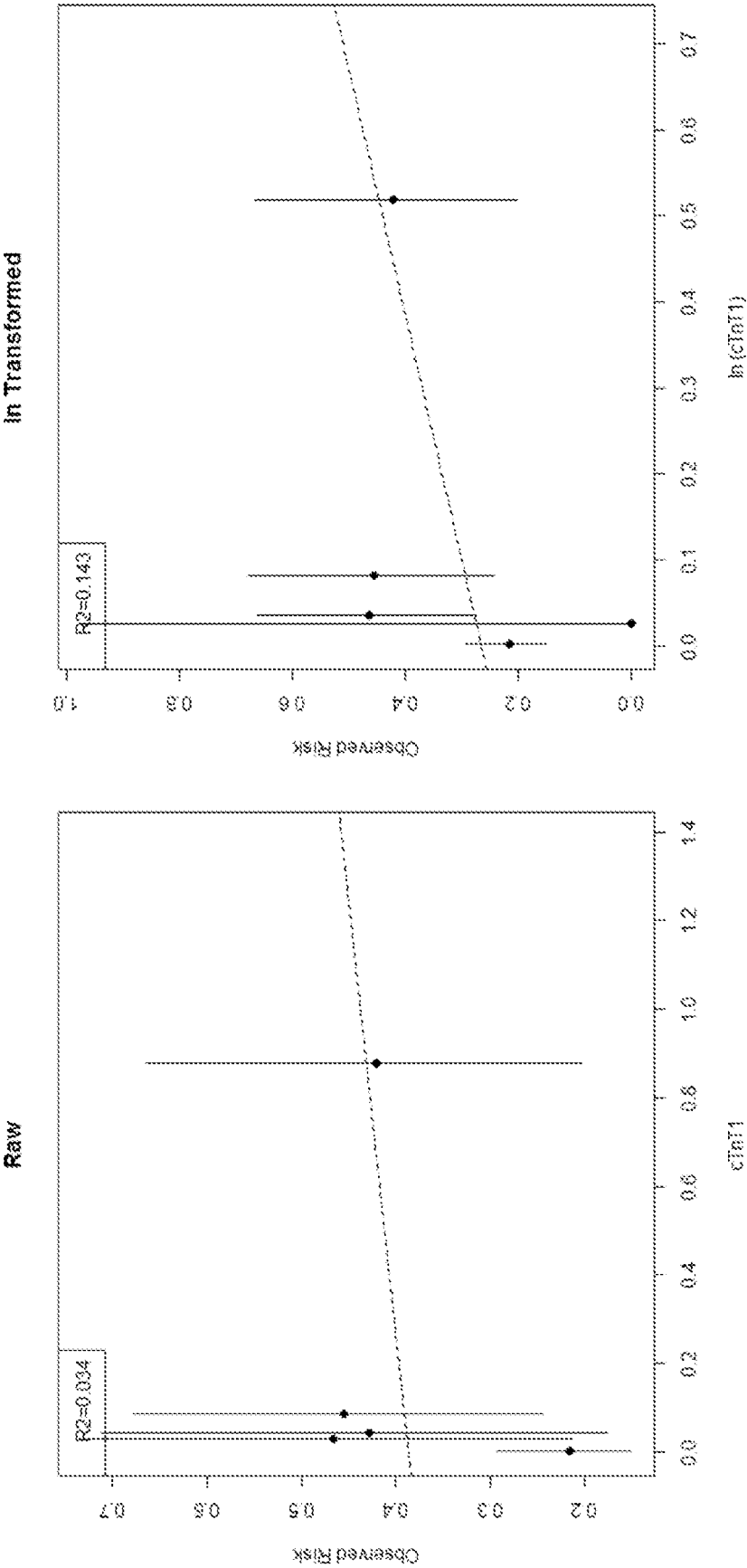


Fig. 47 Linearity Check: NT-proBNP

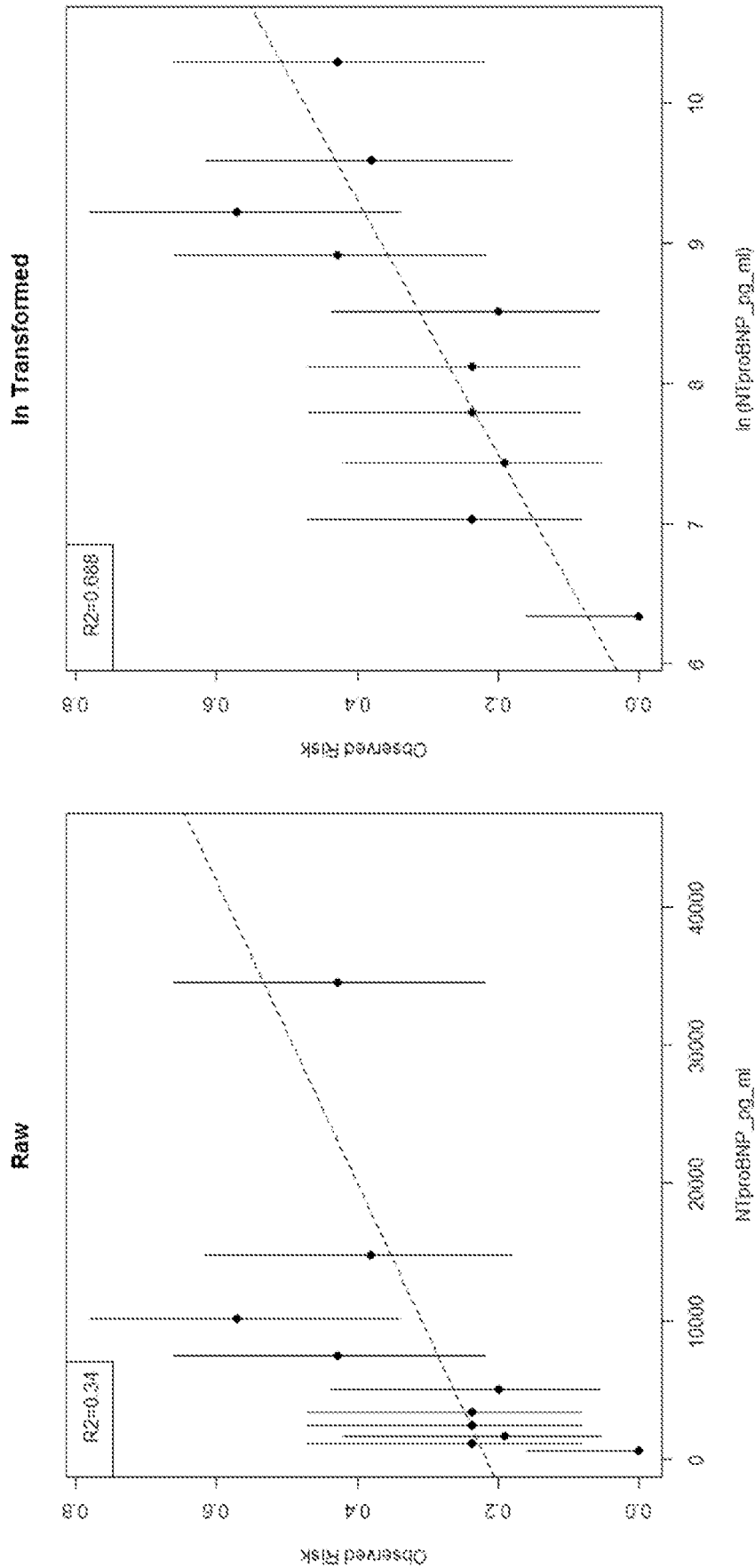


Fig. 48 Linearity Check: CRP

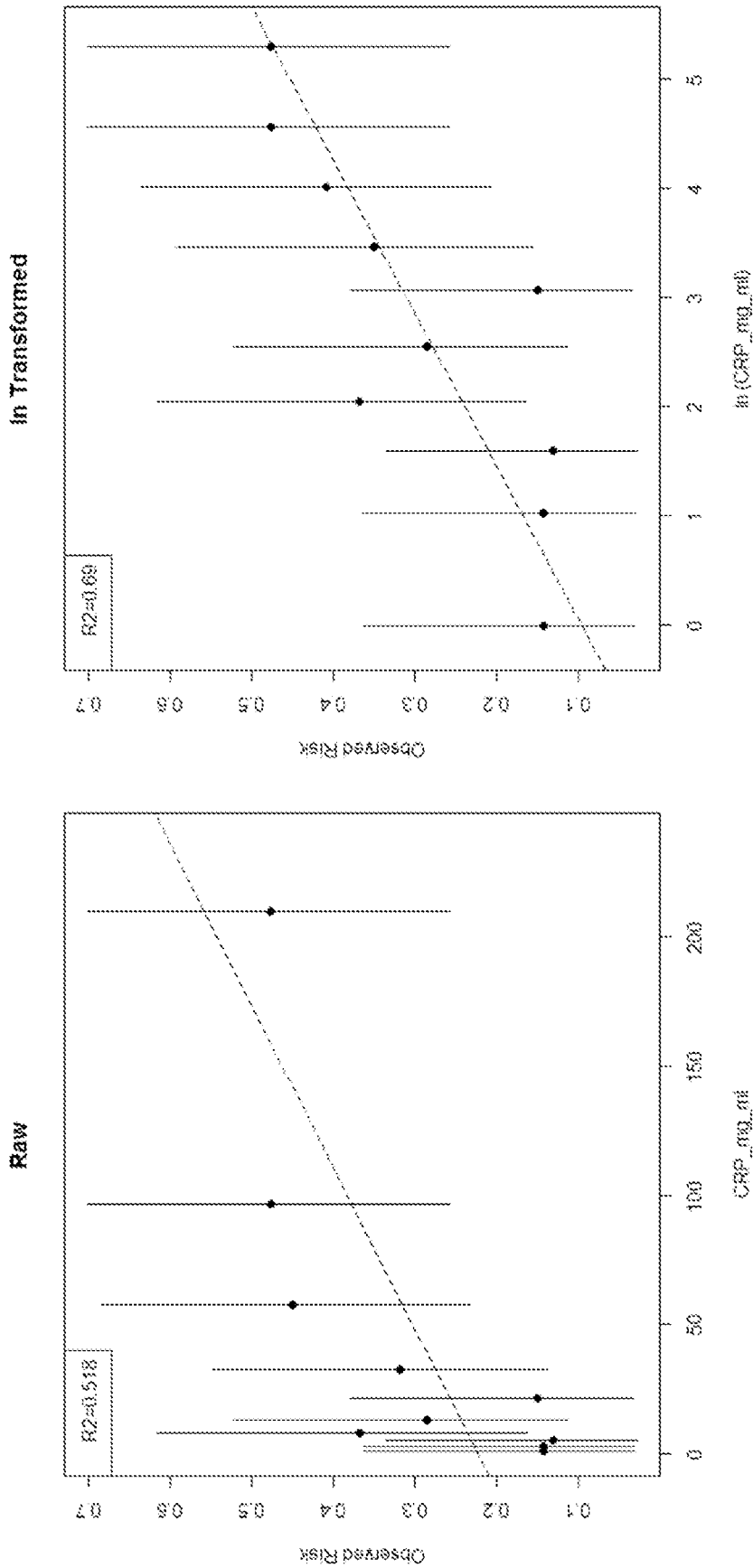


Fig. 49 Linearity Check: ST2

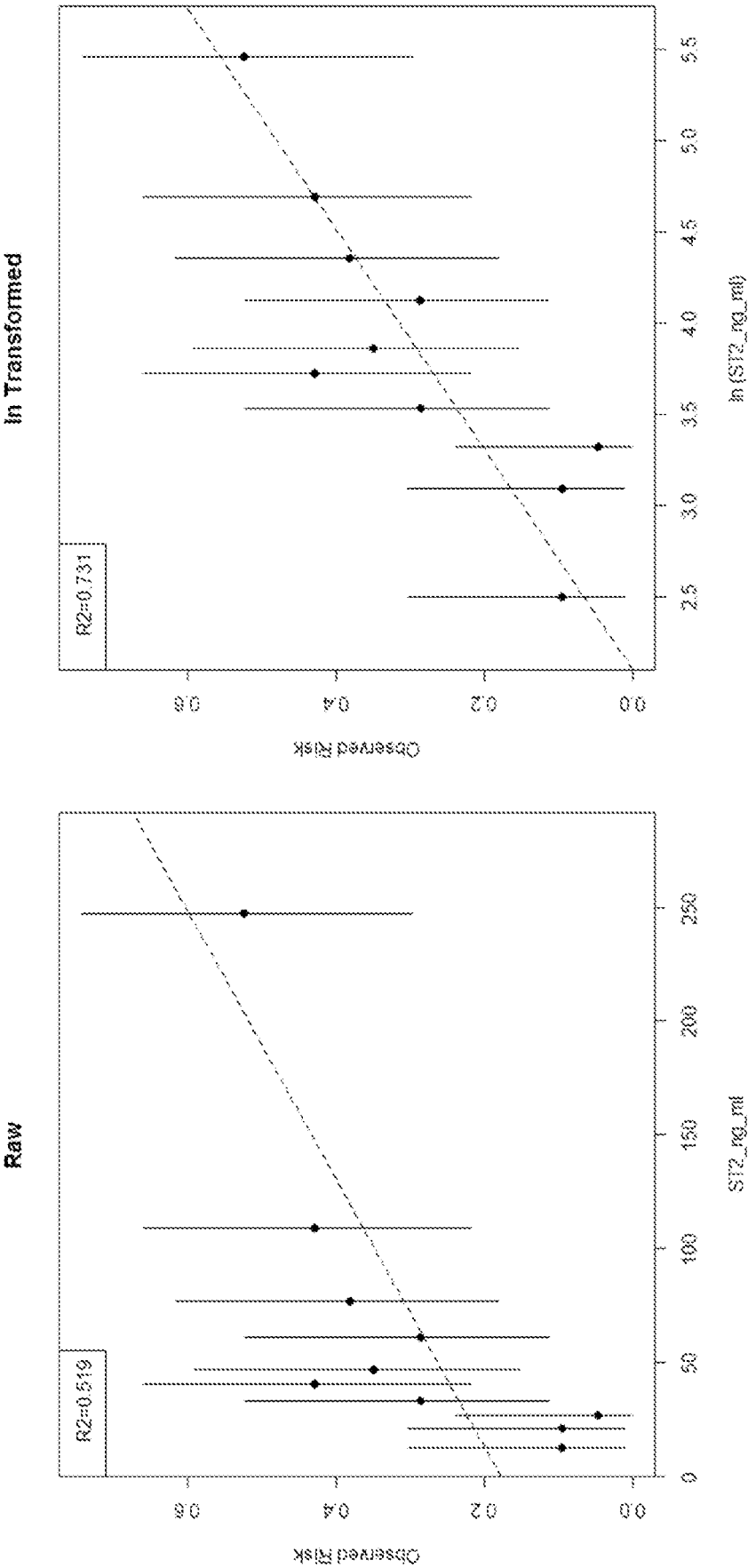


Fig. 50 Summary

	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)

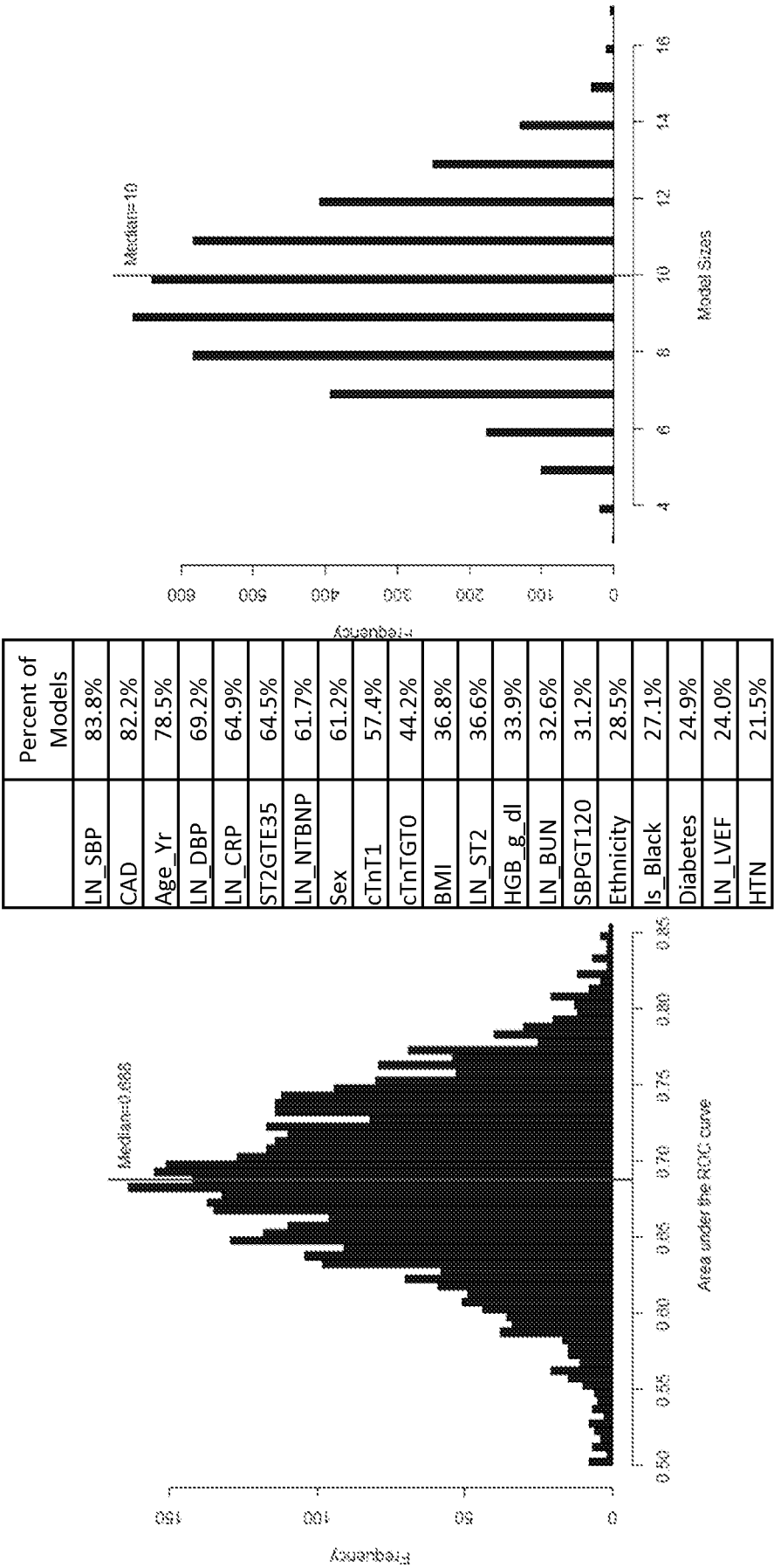


Fig. 52 BIC Based Marker Selection

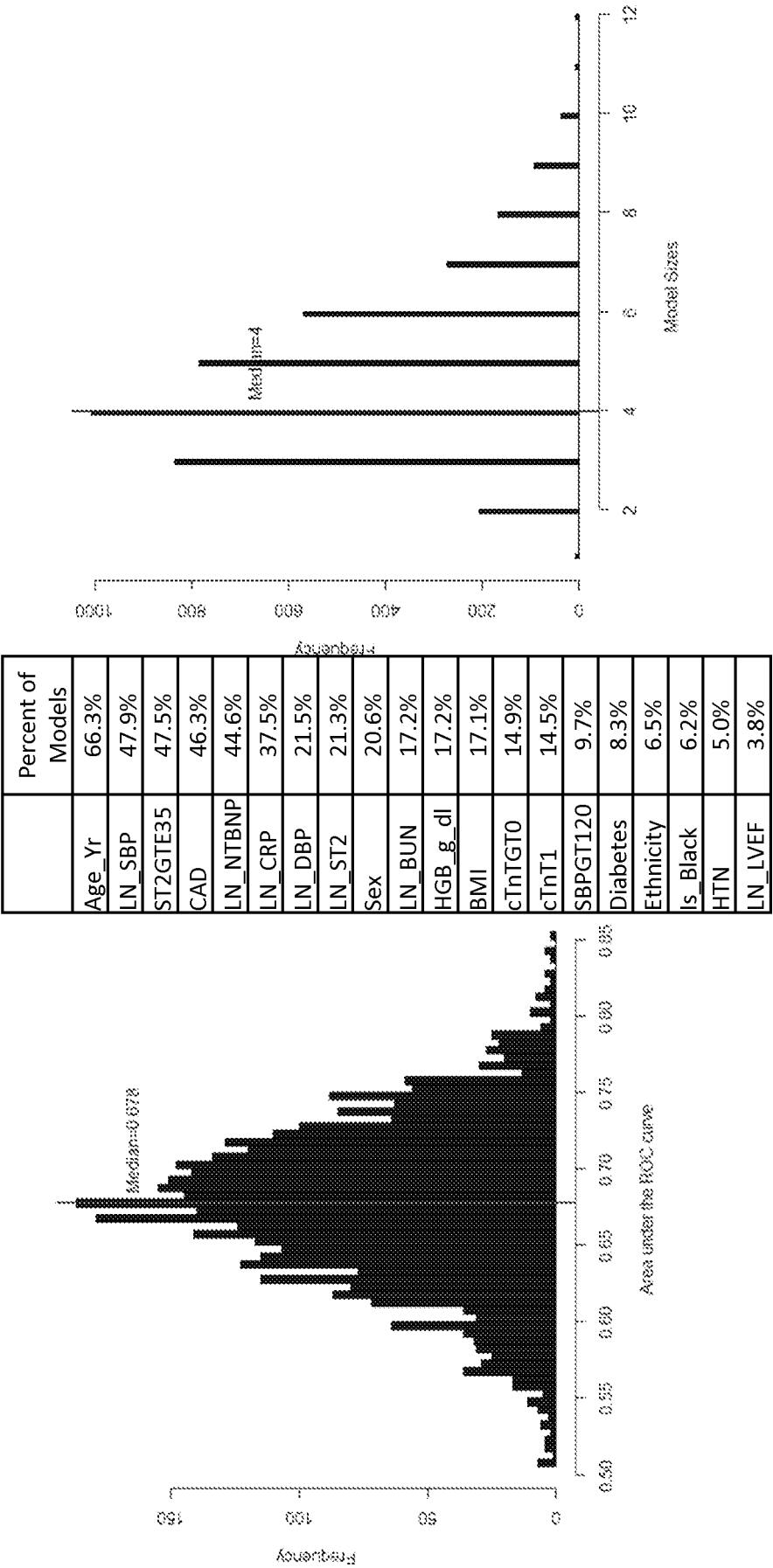


Fig. 53 Comparison of the Two Models

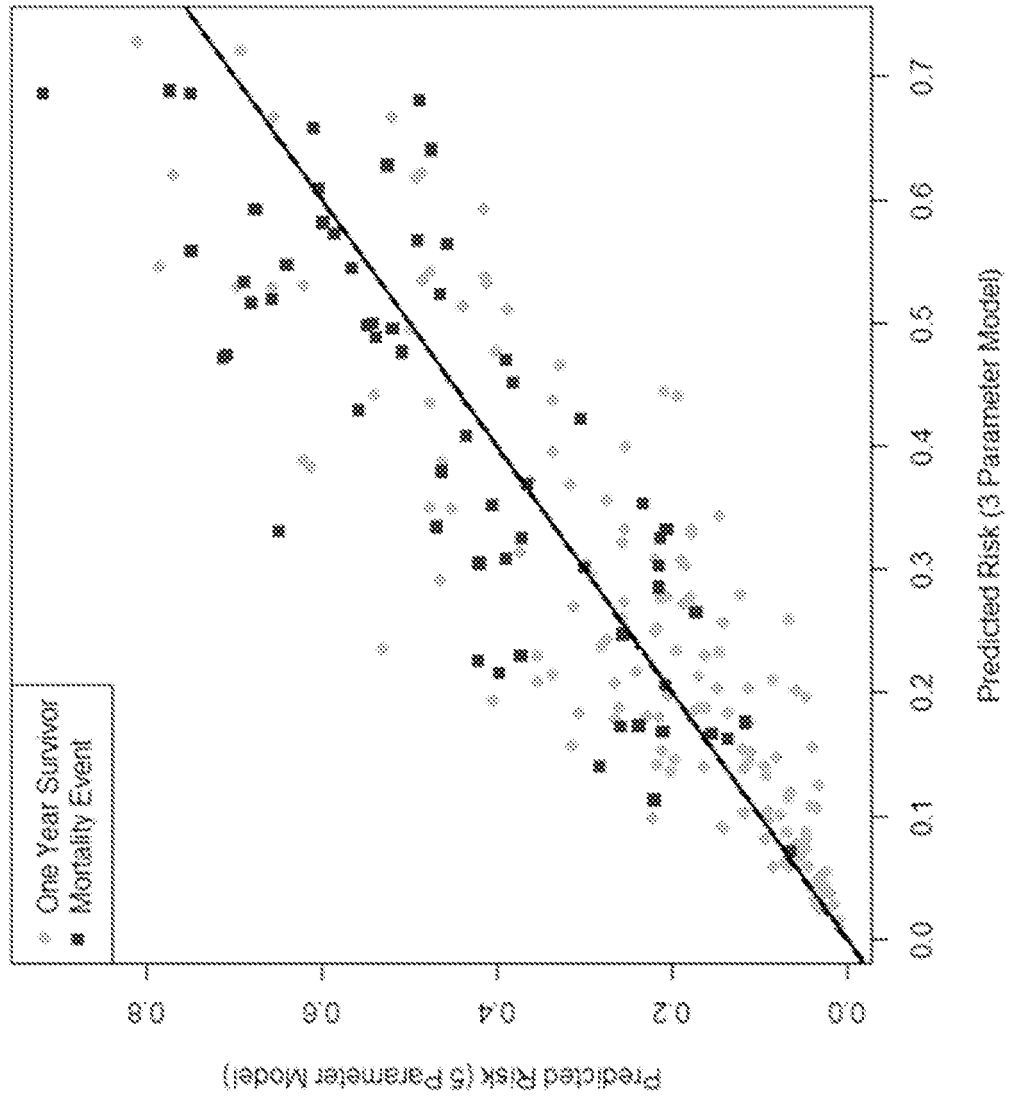


Fig. 54 ROC Curves

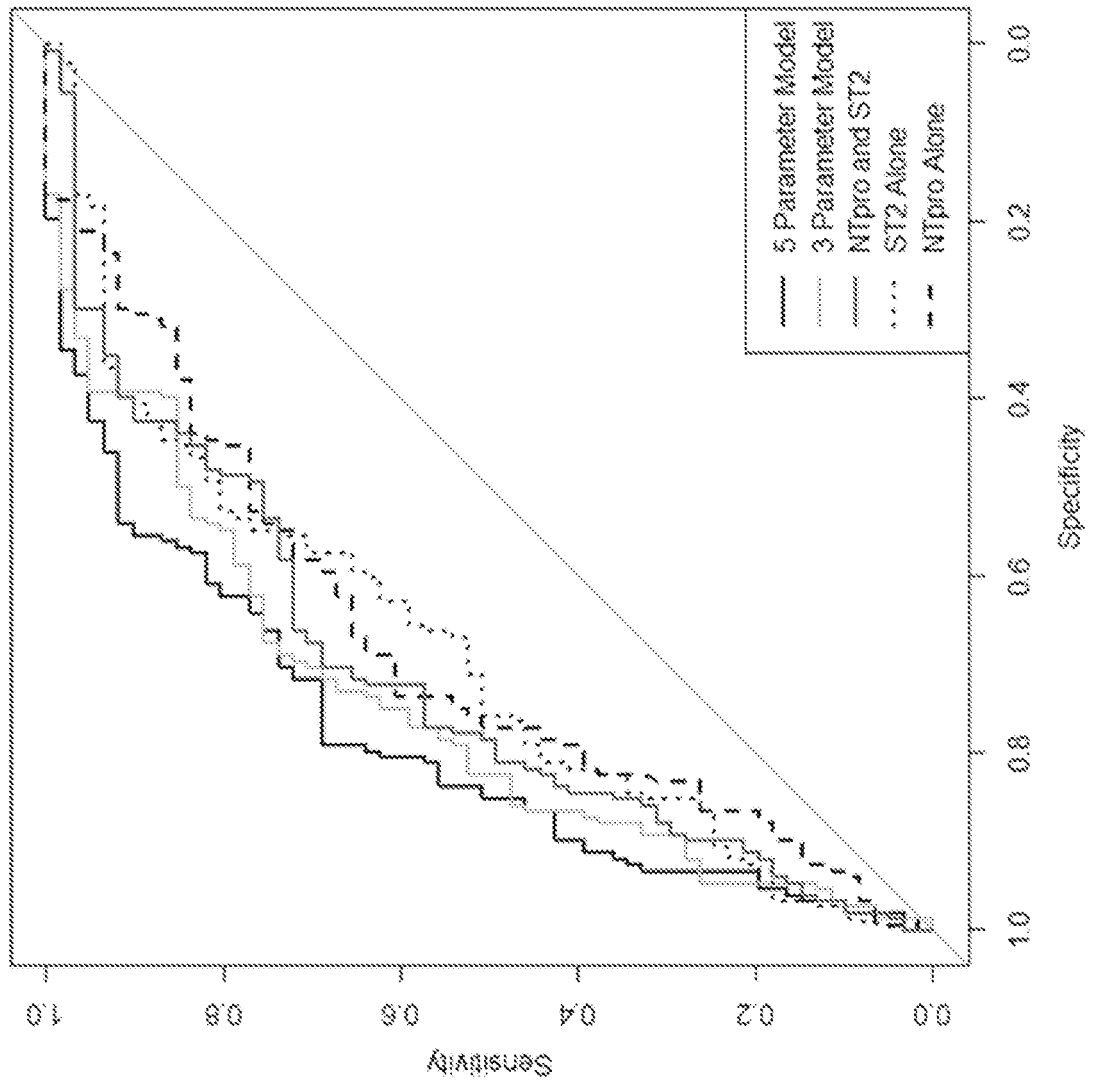


Fig. 55 Bootstrap AUC
“Out of Bag” estimates

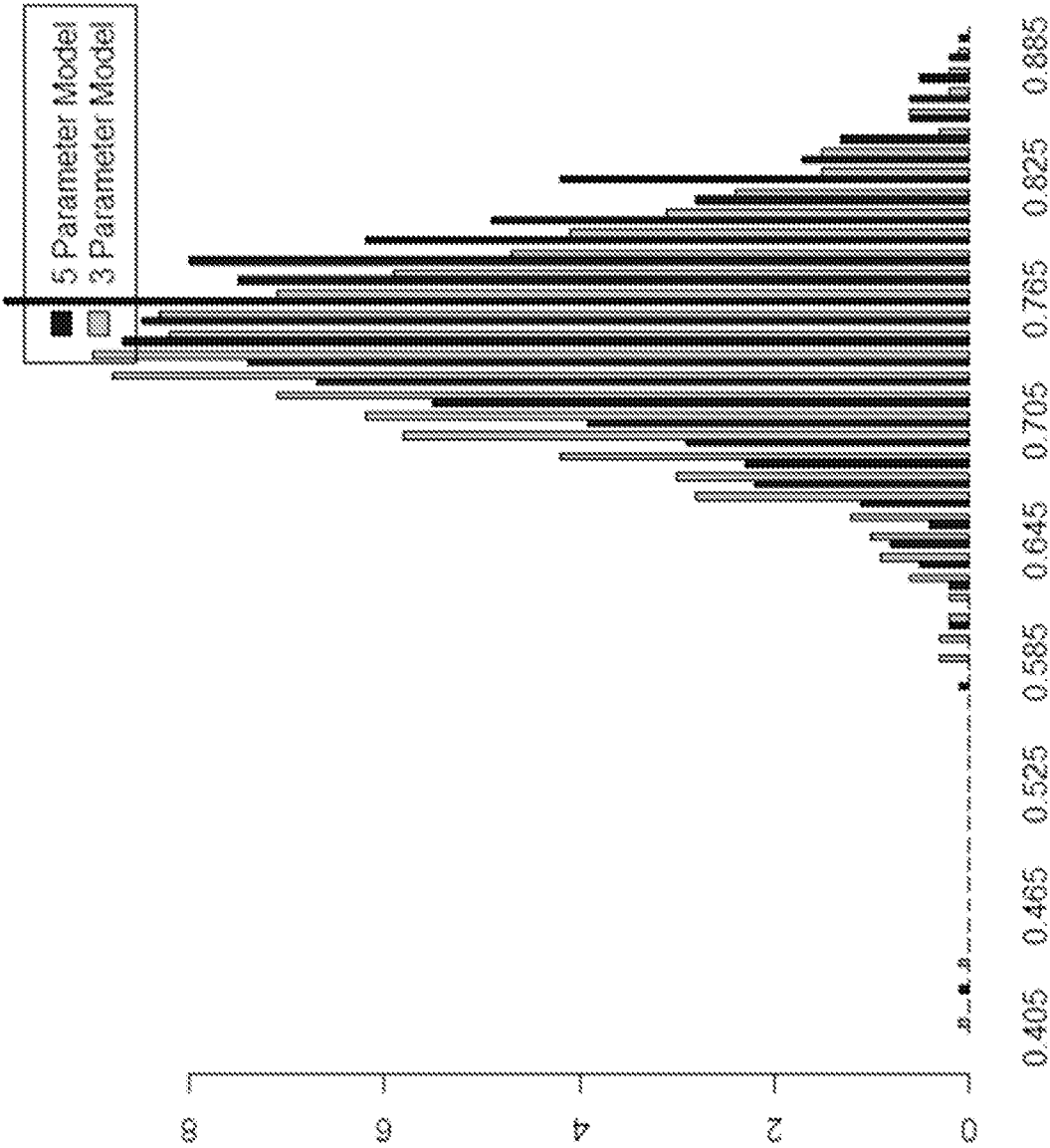


Fig. 56 Model Calibration

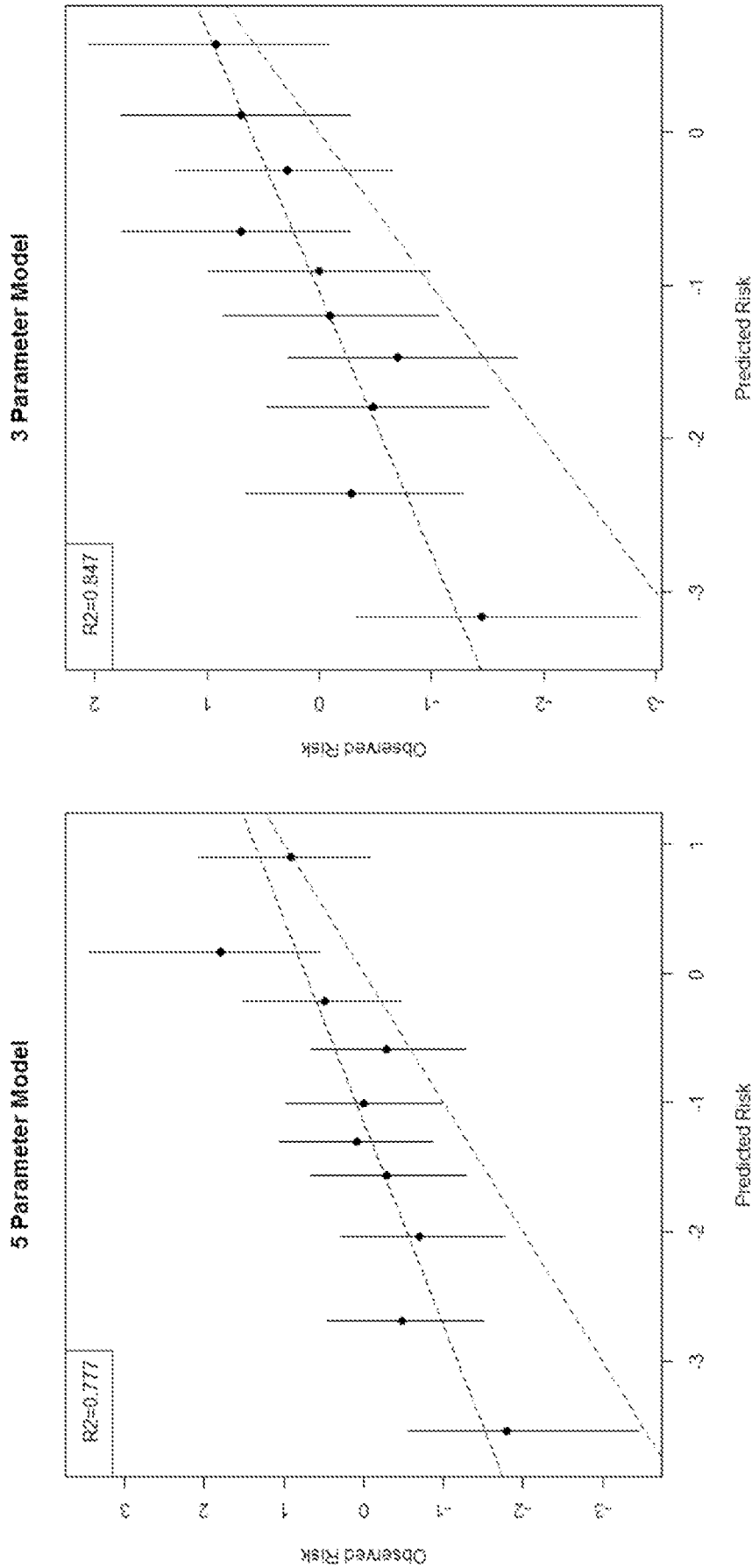


Fig. 57 Model Parameters

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