

# CLASSIFICATION AND THE SURVIVAL ANALYSES IN THE ARTREAT PROJECT

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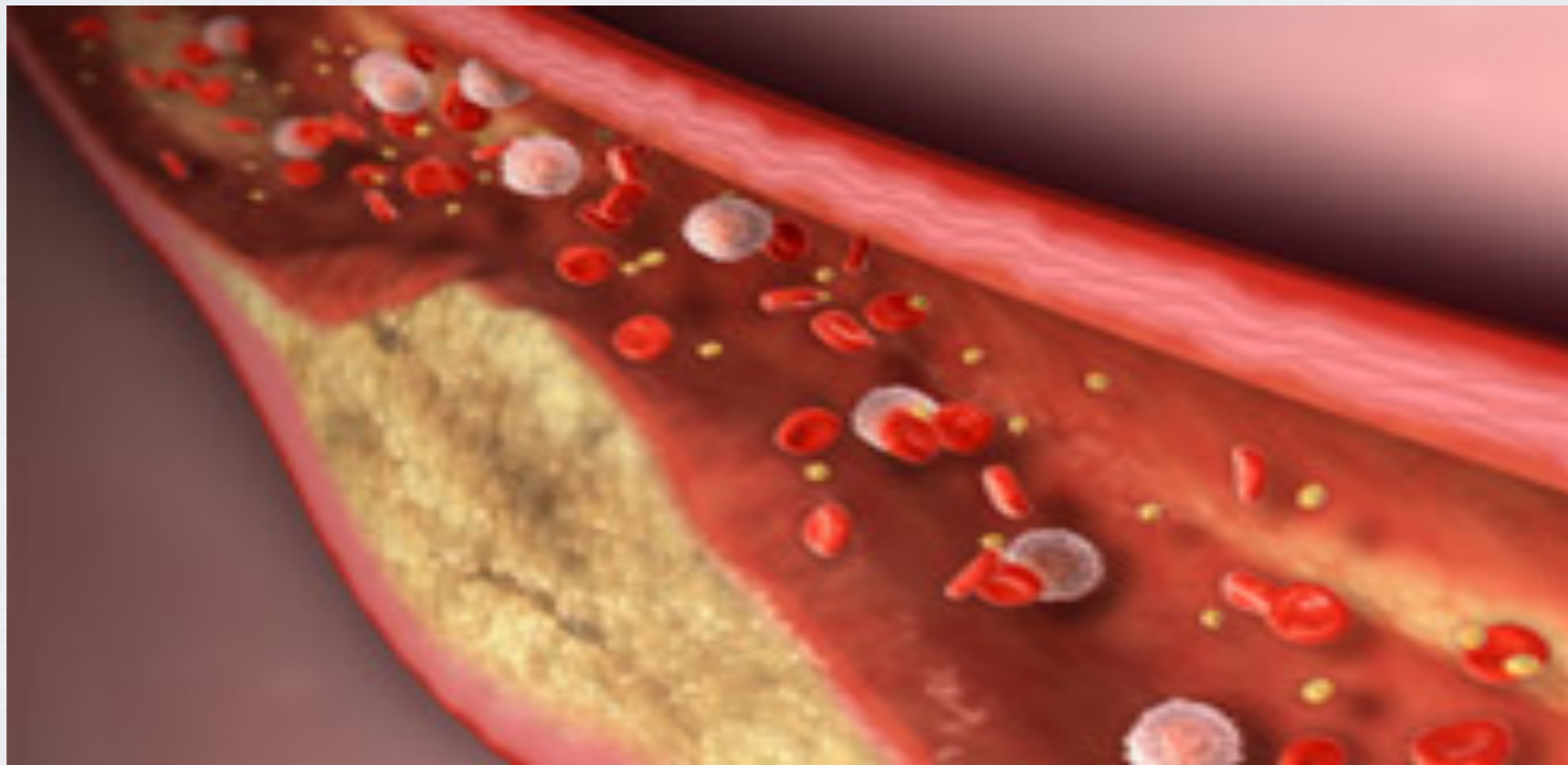
# ARTREAT PROJECT

- ARTreat targets at providing a computational model of the cardiovascular system, to improve the prediction for the atherosclerosis progression and propagation into life-threatening events.
- FP7 Large-scale Integrating Project (IP)
- 16 partners
- Funding: 10,000,000 €



# ATHEROSCLEROSIS

- Atherosclerosis is the condition in which an artery wall thickens as the result of a build-up of fatty materials such as cholesterol



# THE DATA

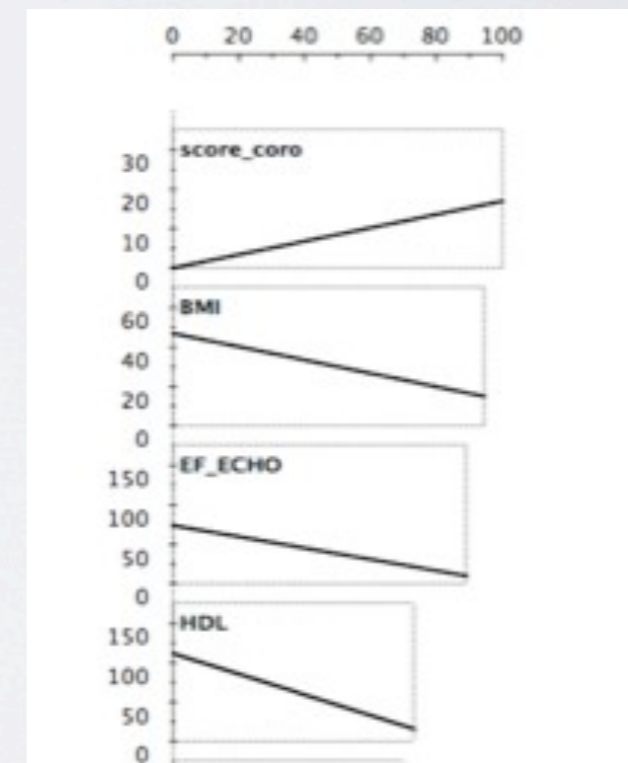
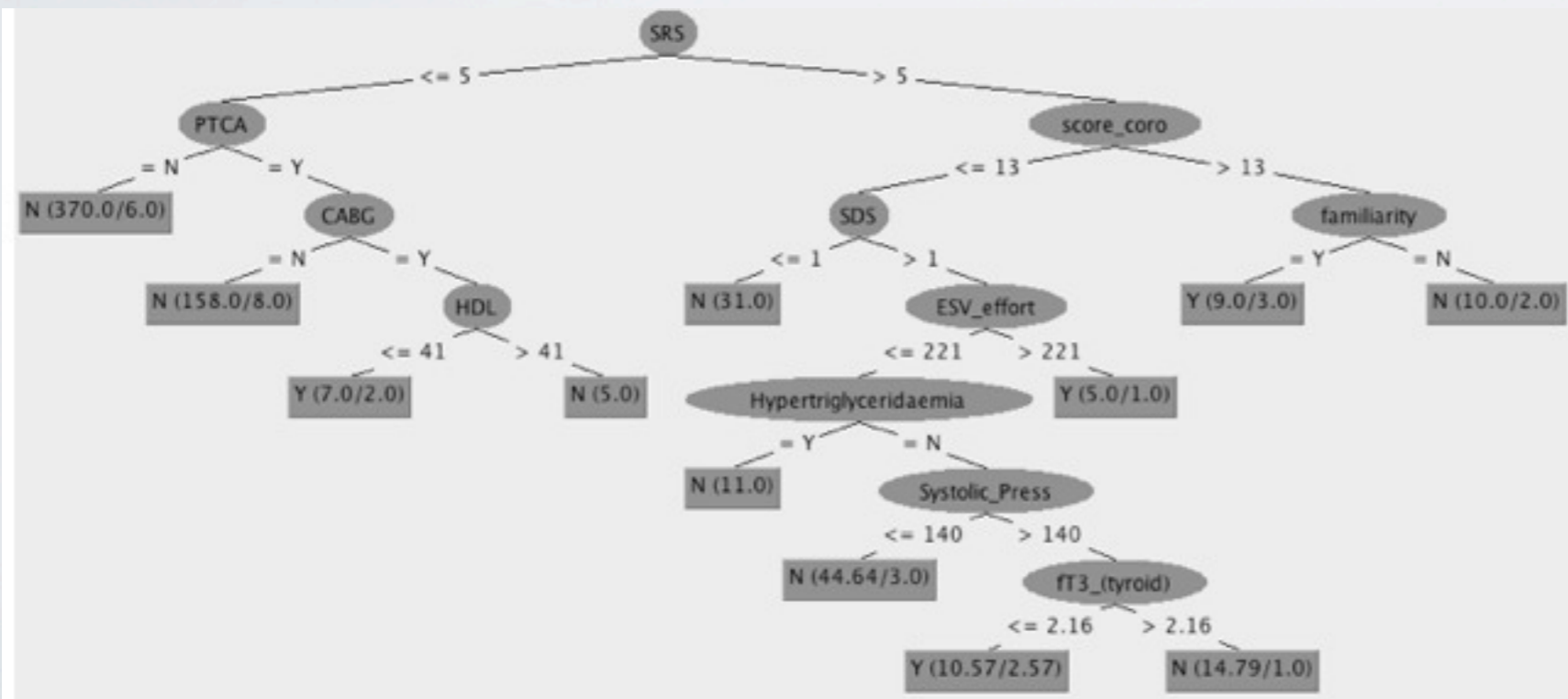
- 3000 patients with 97 attributes
- 450 patients with genetic profiles
- 400 patients with repeated angiographies
- 600 patients with scintigraphies

V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO	AP	AQ	AR	AS	AT	AU	AV	AW	AX
datecor1	vessels	DA	DAP	DAM	DAD	I	S	D	CX	CXP	CXM	CXD	HO	DP	DK	DXP	DXM	DXD	RVDX	MA	DP	TC	hr	pressmin	pressmax	creatinine	cholesterol	hdl
11/18/82	2	75														75												
1/19/83	3	75								75						50	50						60	80	120	1.1	264	
12/13/78	2	90														100							64	80	115	1.0	230	
2/4/83	1	100	100																				60	70	110	1.2	179	
1/14/83	1	90	90																				95	80	110	0.8	144	
5/9/79	2	90							90														64	82	142	1.0	220	
11/3/03	3	100								100	100					100	100						70	70	110	1.59	139 33	
2/16/83	1															90	75	90					65	70	104	1.4	270	
2/16/83	0																						66	85	120	1.0	230	
4/22/83	2	90														90							70	75	115	1.1	223	
3/2/83	3	90	90							75						50	50						60	100	170	1.4	248	
3/6/03	4	50		50						90	90					75	100		100			50	48	90	170	1.08	236 53	
3/30/83	3	90								90						90						75	84	90	140	1.5	238	
4/20/83	2	100							90		50	50											74	80	130	1.7	207	
5/15/79	3	100								90						100	75	75					68	78	118	0.8	415	
11/14/07	3	90				90		50	75	100						50	50		50				64	80	140	1.49	142 29	
4/27/83	3	90	90							75	75												62	82	140	1.1	320	
3/9/83	4																						100	70	80	110	1.1	215
5/4/83	1	90																					64	80	120	0.9	225	
5/13/83	0																						58	80	118	1.2	201	
6/8/83	1															100							60	85	130	1.0	171	
7/13/83	0																						62	85	125	1.2	223	
7/15/83	2	100								90													54	80	120	1.1	189	
5/11/83	3	100								75						100							58	80	140	1.3	209	
4/22/08	4	100								100												100	64	70	135	1.1	140 45	
10/5/83	2	100														100							62	70	110	1.0	294	
10/28/83	2	90														75							78	85	122	0.9	239	
11/11/83	1									75													76	80	120	0.9	250	
2/8/84	3	75		75						100	100					90		90				90	66	92	135	1.0	195	
12/16/83	3	50														100		50		100			76	100	155	1.0	271	
12/2/83	1															50		50					70	75	115	1.1	326	
11/16/83	4	90	75	75	90					90						75	75					75	70	86	130	0.9	235	
1/23/84	1															90	50	90					72	80	120	0.9	218	
10/9/02	1	100		100																			60	80	140	0.92	149 44	
3/12/84	2	50	50						75	50						50	100		100		75		58	80	120	1.2	224	
3/23/84	0																						72	88	138	0.8	307	
2/27/84	1									75	100					100	90						64	70	110	1.1	257	
3/7/84	1	50				50	90	90	90														76	75	124	1.3	189	
3/28/84	3	100														75							78	78	118	1.0	208	
3/28/84	4	90		90																			50	80	90	140	1.4	217



# CLASSIFICATION: HARD EVENTS

- Divide patients into:  
those who had an event vs. those who did not



# CLASSIFICATION: HARD EVENTS

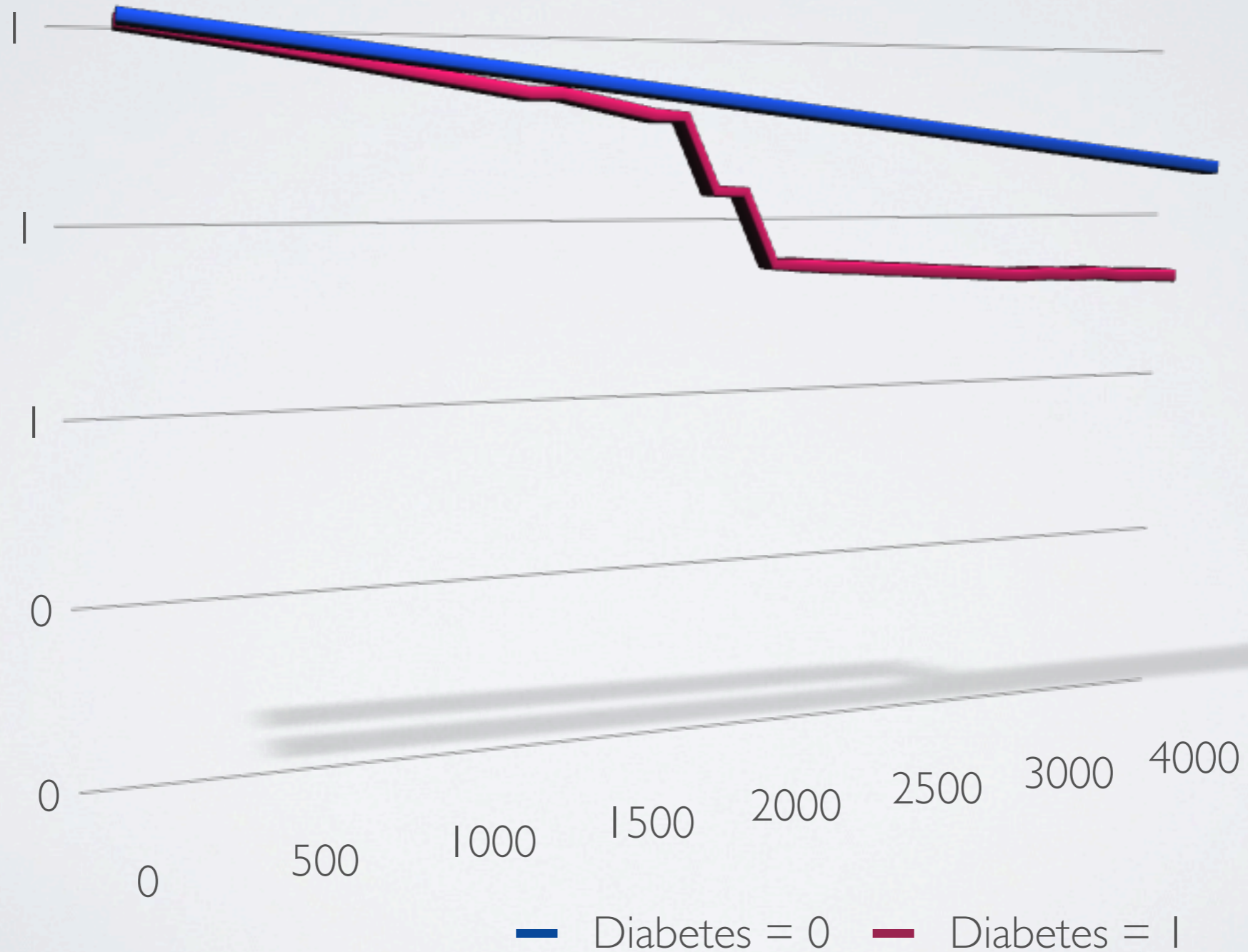
- Interventions in most severe cases change patient characteristics
- Hard event classification became meaningless
- A MACE study (Major Adverse Cardiac Events)
- Better results, still not sufficient



# SURVIVAL ANALYSES

- Type of problems:
  - Study over a period of time
  - In the course of study and event either happens or not
  - Not just about if, but also when

# KAPLAN-MEIER ESTIMATOR





# COX REGRESSION

- Proportional Hazards assumption
- Omits the underlying hazard function
- Gives only a Hazard Ratio
- Relatively Simple, and often sufficient
- Easy to add time varying predictors and covarities