Distribution of Coronary Artery Calcification in a Cardiology Practice Population of more than 13.000 Patients in Germany. Do we Need to Correct the Thresholds for Pharmacological Prevention ?

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Introduction:

Despite all efforts in preventive medicine, coronary artery disease (CAD) is still killer nr. 1 in many countries as it is in Germany. For over 20 years we know that heart attack occur suddenly and unexpectedly, based on a previous "hemodynamically non-significant" lesion. Therefore, the non-obstructive CAD is related to an increased risk of myocardial infarction and mortality. The noninvasive diagnosis of a non-obstructive CAD can easily be performed by the measurement of the coronary artery calcification (CAC)-score. Recent guidelines recommend pharmacological prevention with statins in pats with a CAC-score ≥ 75th percentile. Since the published data bases are usually from the USA and relatively old, we prospectively collected these data in our practice.

Methods:

13.385 primary prevention pats were analyzed, those with known CAD or another cardiovascular disease as well as those with exercise depending symptoms were excluded. CTs were performed with a 16 slice scanner by prospective triggering ("step and shoot") at a slice thickness of 2.5 mm.

Results:

Percentile distribution in men

	35-39 yrs	40-44 yrs	45-49 yrs	50-54 yrs	102.2	60-64 yrs	65-69 yrs
25. perc.	0.0	0.0	0.0	0.0	0.0	3.8	16.4
50. perc.	0.0	0.0	0.3	4.3	25.7	63.7	102.2
75. perc.	0.78	2.4	20.5	65.3	167.9	281.0	440.8
90. perc.	12.2	42.3	130.9	234.4	555.1	815.2	1106.3

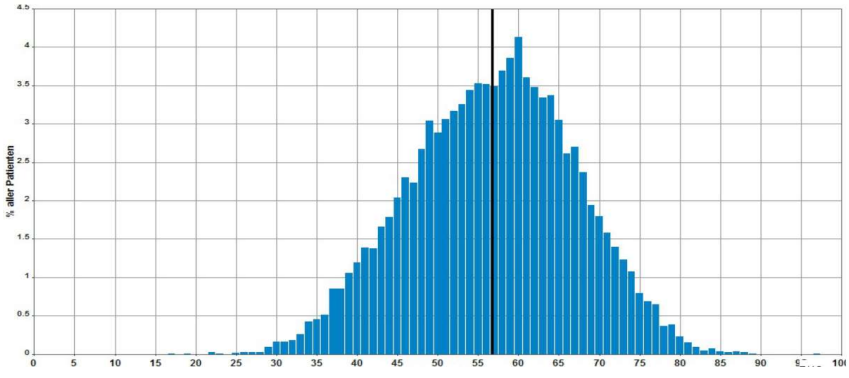
Percentile distribution in women

	35-39 yrs	40-44 yrs	45-49 yrs	50-54 yrs	102.2	60-64 yrs	65-69 yrs
25. perc.	0.0	0.0	0.0	0.0	0.0	0.0	0.0
50. perc.	0.0	0.0	0.0	0.0	0.0	0.0	9.9
75. perc.	0.0	0.0	0.0	1.5	7.4	27.4	85.0
90. perc.	1.2	1.1	14.5	52.7	88.6	166.3	290.3

69% of the pats had arterial hypertension, 52% hyperlipidemia, 20% were active smokers, 37% previous smokers and 7% diabetics.

8657 pats were asymptomatic whereas 4728 had atypical chest symptoms. There were no clinical relevant differences between these groups regarding the CAC-score of left main (5.5 / 5.2), LAD (89.6 / 78.2), RCx (25.3 / 24.0) and RCA (52.6 / 46.5).

Distribution histogram age



Score overall in relation to age and gender

	<35	>=35<40	>=40<45	>=45<50	>=50<55	>=55<60	>=60<65	>=65<70	>=70
Men (9281)	(161)	(430)	(821)	(1276)	(1540)	(1657)	(1563)	(1020)	(813)
10. perc.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.78
25. perc.	0.00	0.00	0.00	0.00	0.00	0.00	3.80	16.43	62.80
50. perc.	0.0	0.0	0.0	0.3	4.3	25.7	63.7	107.2	240.3
75. perc.	0.00	0.78	2.40	20.48	65.32	167.90	281.00	440.77	280.00
90. perc.	2.10	12.17	42.30	130.95	234.41	555.10	815.22	1106.26	1665.22
Mean	2.1	10.2	23.7	49.8	88.7	200.4	285.3	390.3	609.5
SD	10.4	48.6	97.5	168.4	268.5	487.7	578.2	313.5	916.8
Women (4104)	(29)	(68)	(169)	(368)	(575)	(763)	(835)	(676)	(621)
10. perc.	0	0	0	0	0	0	0	0	0
25. perc.	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4
50. perc.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	9.85	41.40
75. perc.	0.00	0.00	0.00	0.00	1.50	4.70	27.35	85.03	227.60
90. perc.	0.00	1.22	1.12	14.52	52.74	88.58	166.32	290.25	509.90
Mean	0.5	2.9	4.2	13.1	27.1	40.2	72.7	121.4	216.2
SD	2.4	13.2	22.2	64.0	116.8	152.9	295.0	342.4	528.3

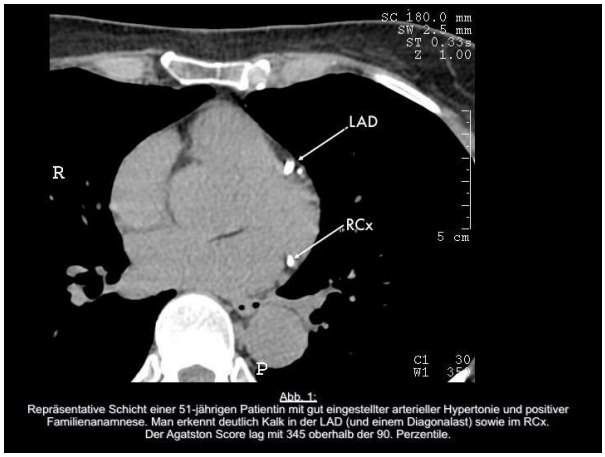
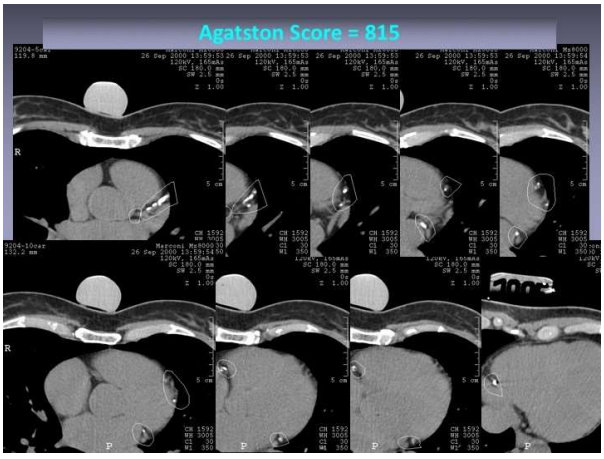


Abb. 1:
Repräsentative Schicht einer 51-jährigen Patientin mit gut eingestellter arterieller Hypertonie und positiver Familienanamnese. Man erkennt deutlich Kalk in der LAD (und einem Diagonalast) sowie im RCx. Der Agatston Score lag mit 345 oberhalb der 90. Perzentile.



Linear Modell of overall scores (logarithm) in relation to different risk factors

	Coefficient	Lower CI (95%)	Upper CI (95%)	*p* value
Intercept	0.03	0.02	0.04	< 0.01
Age (years)	1.10	1.10	1.11	< 0.01
Male sex	2.88	2.57	3.23	< 0.01
Former smoker	1.38	1.25	1.53	< 0.01
Current smoker	1.79	1.57	2.04	< 0.01
Diabetes mellitus	1.52	1.29	1.81	< 0.01
Hypertension	1.33	1.21	1.46	< 0.01
Hyperlipidaemia	1.15	1.04	1.26	< 0.01
MI in family history	1.44	1.31	1.59	< 0.01
Atypical angina	1.03	0.93	1.14	n.s.

Percentage of different risk factors

group	n	pct	Mean_SD	group	n	pct	Mean_SD
gender	13385	100%		Hyperlipidaemia	13141	98%	
Male			69% (9281)	Yes			52% (6857)
Female			31% (4104)	no			45% (5857)
age	13385	100%	56.8+-10.3	unk			3% (427)
Current smoker	13160	98%		Diabetes mellitus	13123	98%	
Yes			20% (2640)	Yes			7% (860)
no			80% (10520)	No			93% (12171)
Former smoker	11984	90%		unk			1% (92)
Yes			37% (4491)	MI_family	12987	97%	
No			63% (7493)	Yes			45% (5787)
Hypertension	13167	98%		no			55% (7081)
Yes			45% (5898)	ASS	2258	17%	
No			55% (7185)	Yes			12% (265)
unk			1% (84)	no			88% (1990)

Conclusion:

The limits for the percentile distribution in our population of 13.385 pats are consistently lower than a previous standard data base published 18 years ago in 9728 pats. Differences may be due to methodological and/or regional reasons, may be our population is more aware of a healthy life style. Nevertheless, the guideline-oriented recommendation of a certain CAC-score threshold for statin administration in primary prevention should be made on a regional, up-to-date data base.