Are the complications of arteriovenous fistulas associated with an abnormal Ankle-Brachial Index in Hemodialysis? A 4y study

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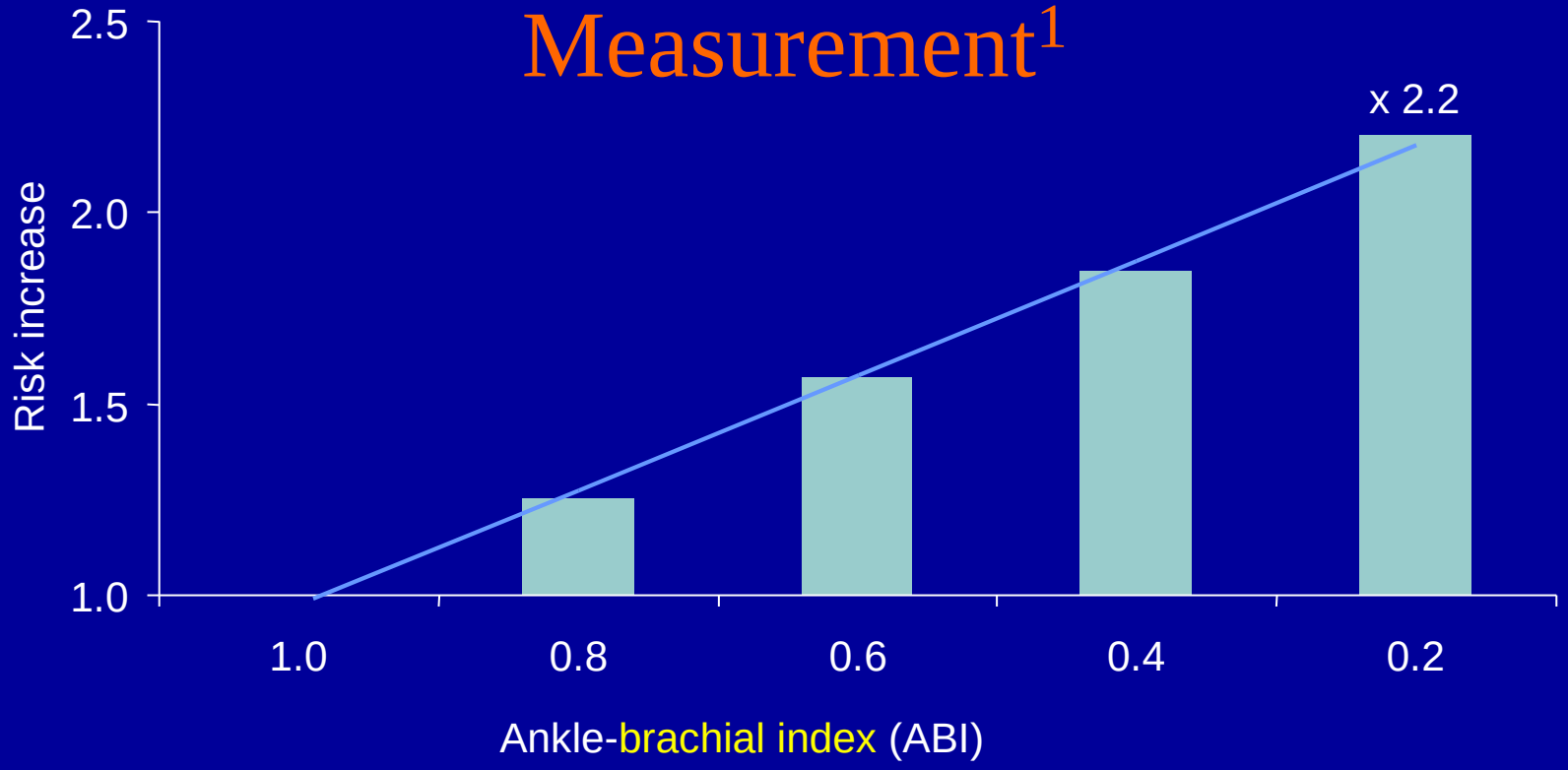
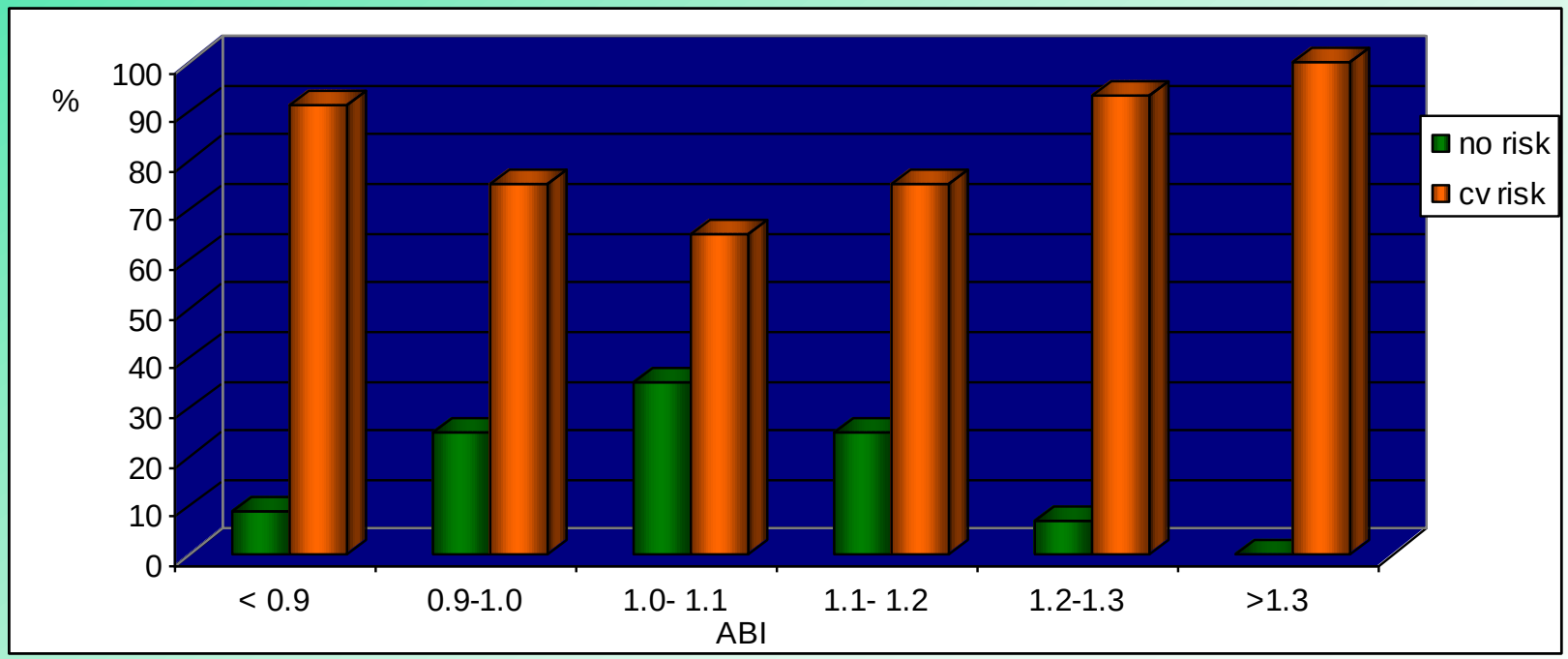
Atherothrombosis is a Systemic Disease: Increase for Myocardial Infarction and Stroke as a Function of ABI Measurement[1]



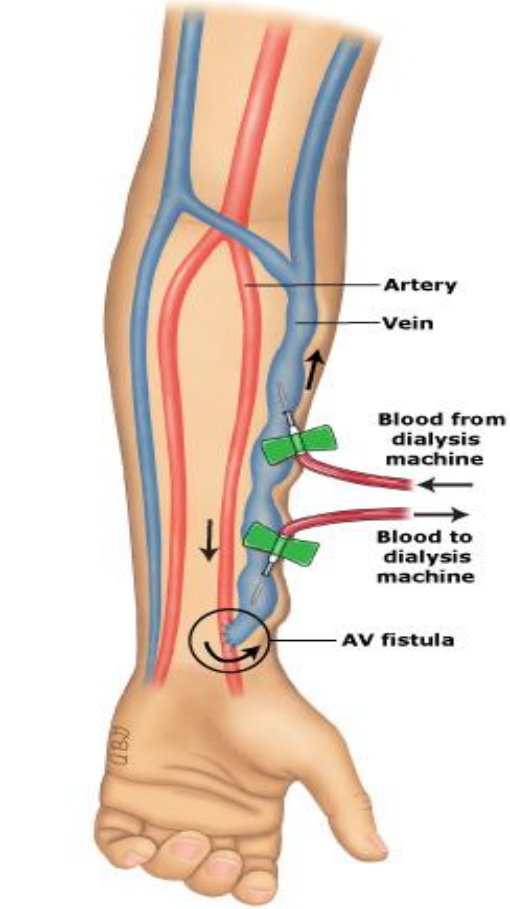
1. Dormandy JA, Creager MA. *Cerebrovasc Dis* 1999; 9(suppl 1): 14.

Distribution of 83 HD patients according to CV risk and ABI

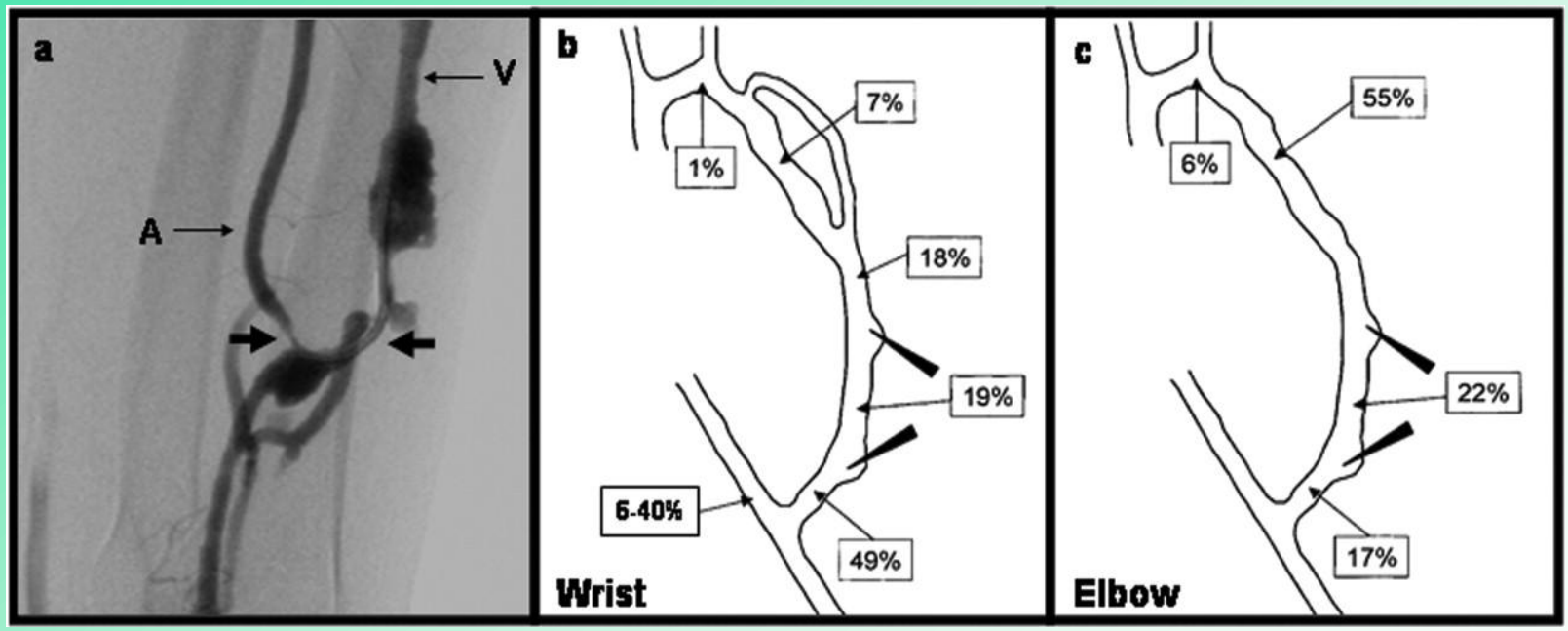


At least one cv complication:
LVH; MI; stroke; Heart failure

AV fistula is the recommended vascular access in HD but Vascular access failure (stenosis and thrombosis) is frequent, especially due to atherosclerosis.



AVF problems



Roy-Chaudhury, P. et al. J Am Soc Nephrol 2006;17:1112-1127

Aims of the study

1. Could ABI<0.9 be a risk indicator of vascular access failure?

2. Could repeating ABI measurements be useful in the follow up of patients, especially for the AV Fistula outcome?

METHODS

Recording of Arteriovenous Fistula complications during 4y: thrombosis and stenosis requiring angioplasty

-**Ankle Brachial Index** = [Ankle SBP/Brachial SBP] (ABI) was measured after 1h of HD session on both ankles and on the non fistula arm.
-The lowest ratio was retained.
Technic: hand held doppler : Bidop ES-100V3 HADECO
ABI measured at baseline, after 1 and 4 years later

- Predialysis BP was averaged on the last 12 dialysis sessions.
- Biological parameters averaged on the last 3 months (CRP, lipids, Ca-P, PTH, albumin, uric acid).

Patients' characteristics (N=38)

- Age : 63.5y
- M/W : 22/16
- Dialysis vintage : 6.2y
- Diabetes mellitus :10
- Smokers : 21
- Past history of CV events: 30
- HTN: 33
- Statins : 10

ABI modifications at 4 years interval

ABI Baseline levels		ABI levels 4 years later: < 0.9	0.9 – 1.3	> 1.3	Unc. arteries *
0.9 – 1.3	n=20	4	10	1	5
< 0.9	n=14	11	1	0	2
➢1.3	n=4	0	0	1	3

N = 38

* uncompressible arteries

Contribution of a single ABI

Last ABI ------>	**ABI <0.9 N=15**	**ABI >0.9 N=23**
Age	71.6 ± 16	64.5 ± 17
M/W	9/6	13/10
Dialysis vintage (years)	7.7 ± 7	11.6 ± 11
VAF: thromb, stenosis	8 (53%) (4T, 4 S)	17 (74%) (**13T**, 4S)
AVF survival time (m)	59 ± 46 Median: 60	80 ± 89 Median: 65
Smoking	**14 (93%)** $^{0.009}$	13 (56%)
Calcifications (XR ay chest)	**13 (87%)** $^{0.04}$	14 (61%)
4y Mean Ca (mg/dl)	**9.5 ± 0.5** $^{0.02}$	8.5 ± 0.4
Predialytic SBP (at 4 years)	**153 ± 16** $^{0.005}$	135 ± 20
Predialytic Pulse P (at 4 years)	**82 ± 13** $^{0.005}$	67 ± 15

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Contribution of repeated ABI measurements at different occasions.

ABI evolution in 4 years ------>	**ABI <0.9 N=15**	**Unmeasurable ABI (uncompressible arteries)N=10**
Age	71.6 ± 16	68.5 ± 12
M/W	9/6	7/3
Dialysis vintage (y)	7.7 ± 7	11.6 ± 11
VAF: thromb, stenosis	8 (53%)(4T,4S)	7 (70%) (7T)
Smoking (current and former)	11 (73%) 0.05	4 (40%)
Baseline P (mg/dl)	4.64 ± 0.9	5.45 ± 0.9 0.06
Baseline PixCa (mg^2/dl^2)	39.6 ± 12	50 ± 9.6 0.04
Predialytic Pulse P (at 4 years)	82 ± 13 0.04	71 ± 17

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Discussion and Conclusions (1)

In HD patients:

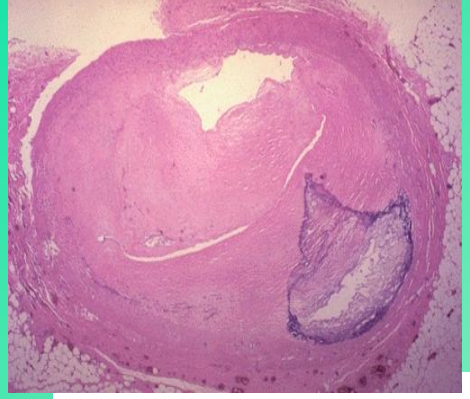
- A single ABI measurement when <0.9 is associated with classical cardiovascular risk factors well-known in peripheral artery occlusive disease, but also a high risk of mortality (data not shown).
- But, it does not predict an increase of vascular access failure frequency.

Discussion and Conclusions (2)

In HD patients:

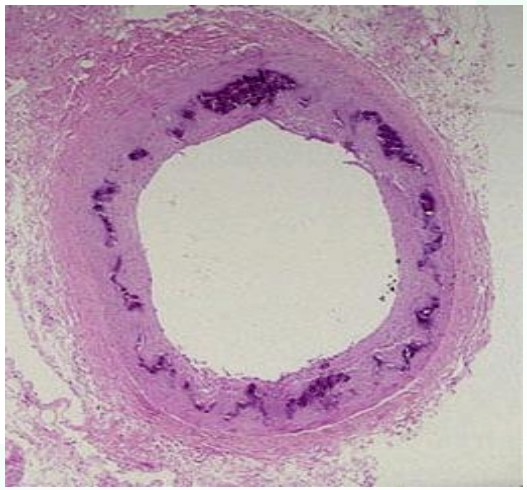
- Modification of ABI during FU gives more information on the outcome of the AVF.
- The uncompressible arteries at the lower limb was associated with a higher rate of AVF thrombosis and with more mineral metabolism abnormalities.
- A low ABI value during FU was more often associated with smoking and very high PP.

- We suggest that ABI should be regularly measured in HD population for estimation of CV risk but also of AV Fistula outcome!



Two types of risk factors

Risk Factor	Intimal/Atherosclerotic Calcification	Medial/Mönkeberg's Calcification
Dyslipidemia	Yes	No
Advanced age	Yes	Yes
Elevated blood pressure	Yes	Reciprocal (medial lesions worsen blood pressure)
Male	Yes	No
Smoking	Yes	No
Inflammation	Yes (local)	Yes (systemic mediators)
Diabetes/glucose intolerance	Yes	Yes
Kidney disease		
Reduced GFR	No	Yes
Calcium		
Hypercalcemia	No	Yes
Positive balance	No	Yes
Hyperphosphatemia	Yes	Yes
PTH abnormalities	No	No
Vitamin D administration	No	Yes
Duration of treatment with dialysis	No	Yes



Goodman, Am J Kidney Dis, 2004

ACCELERATED ATHEROSCLEROSIS IN PROLONGED MAINTENANCE HEMODIALYSIS

ARMANDO LINDNER, M.D., BERNARD CHARRA, M.D., DONALD J. SHERRARD, M.D., AND BELDING H. SCRIBNER, M.D.

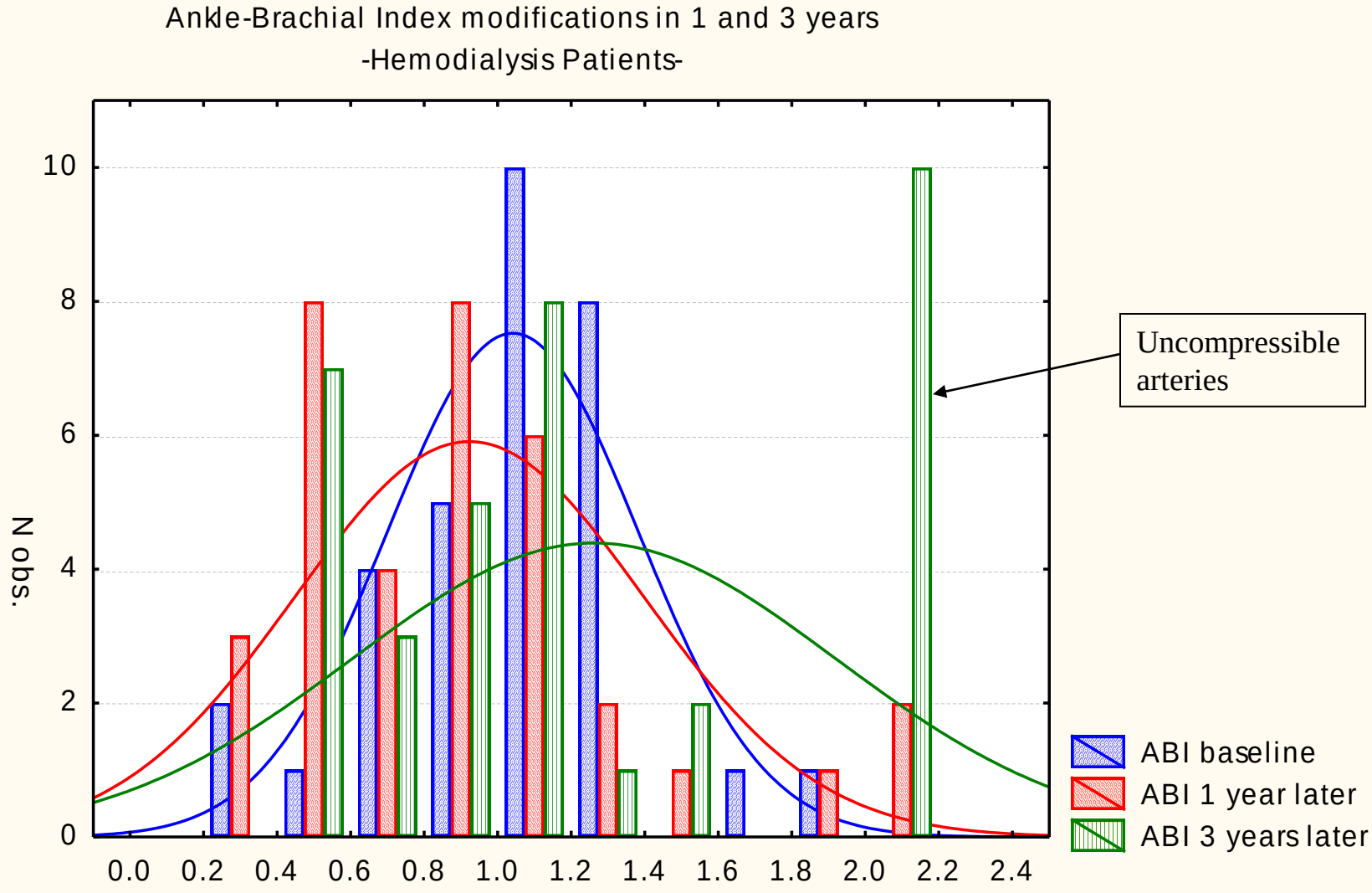
Traditional risk factors

- Older age
- Hypertension
- Male gender
- Elevated LDL and Decreased HDL cholesterol
- Diabetes mellitus
- Tobacco use
- Psychosocial stress
- Family history of CVD

Non-traditional risk factors

- ECF overload
- Anemia
- **Abnormal mineral metabolism**
- Malnutrition
- Inflammation/Infection
- Thrombogenic factors
- Oxidative stress
- Proteinuria
- Uremic toxins

CHU de Liège


Ankle-Brachial Index modifications in 1 and 3 years
-Hemodialysis Patients-
N obs.
0
2
4
6
8
10
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
2.2
2.4
Uncompressible arteries
ABI baseline
ABI 1 year later
ABI 3 years later