

# **Risk of Adverse Events in Peripheral Artery Disease Patients with Below-Knee Disease:**

## ***An Analysis from the VOYAGER-PAD Catheter-based Angiographic Core Lab***

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***Scientific Sessions of the American College of Cardiology***

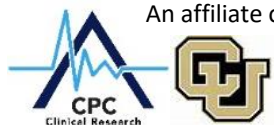
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# Disclosures

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# Background & Objectives

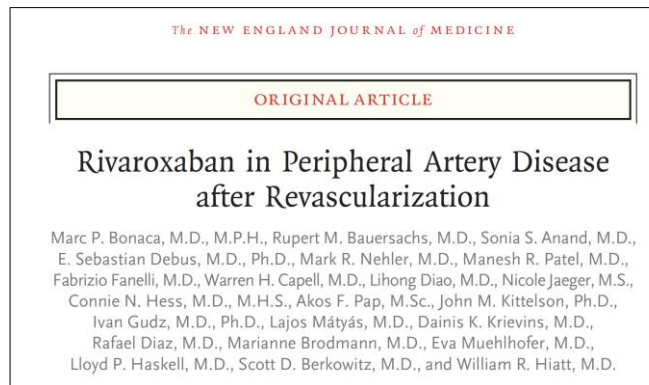
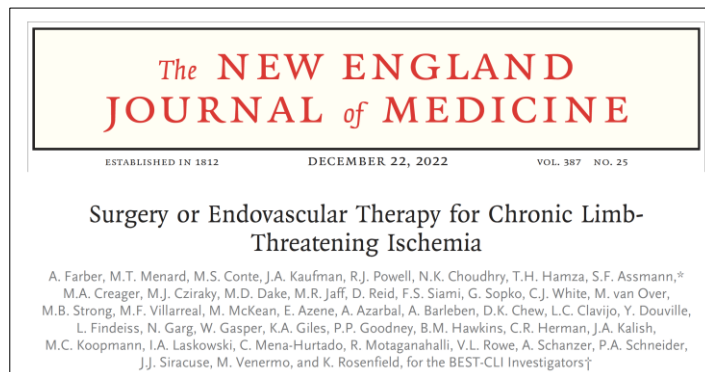
- **Peripheral artery disease (PAD) confers an increased risk of cardiovascular events.**
- **Certain PAD subgroups are at higher risk and need to be identified.**
- **PAD anatomy may help to identify specific subgroups at higher risk, but the relationship of PAD anatomy and adverse events has not been well characterized.**
- **Our objective is to examine clinical characteristics and adverse event rates in the VOYAGER-PAD angiographic core lab data according to the presence of Below-Knee Disease (BKD).**

# PAD Patients at Heightened Risk of MALE

## BEST-CLI

## VOYAGER-PAD

## BASIL-2



A vein bypass first versus a best endovascular treatment first revascularisation strategy for patients with chronic limb threatening ischaemia who required an infra-popliteal, with or without an additional more proximal infra-inguinal revascularisation procedure to restore limb perfusion (BASIL-2): an open-label, randomised, multicentre, phase 3 trial

Andrew W Bradbury, Catherine A Moakes, Matthew Popplewell, Lewis Meecham, Gareth R Bate, Lisa Kelly, Ian Chetter, Athanasios Diamantopoulos, Arul Ganeshan, Jack Hall, Simon Hobbs, Kim Houliand, Hugh Jarrett, Suzanne Lockyer, Jonas Malmstedt, Jai V Patel, Smitaa Patel, S Tawqeer Rashid, Athanasios Saratzis, Gemma Slinn, D Julian A Scott, Hany Zayed, Jonathan J Deeks, on behalf of the BASIL-2 Investigators

Of 1813 CLTI patients, 888 (49%) experienced primary events (death, MALE) over median Follow up of 2.7 years

Of 6564 symptomatic PAD patients, 1092 (17%) experienced primary outcome (limb and CV events) over median Follow up of 2.3 years

Of 345 CLTI patients (BK revasc), 200 (58%) experienced primary outcome (major amp / death) over median follow up of 3.3 years

Farber. . . Rosenfield, et al. NEJM Nov 2022

Bonaca . . . Hiatt, et al NEJM March 2020

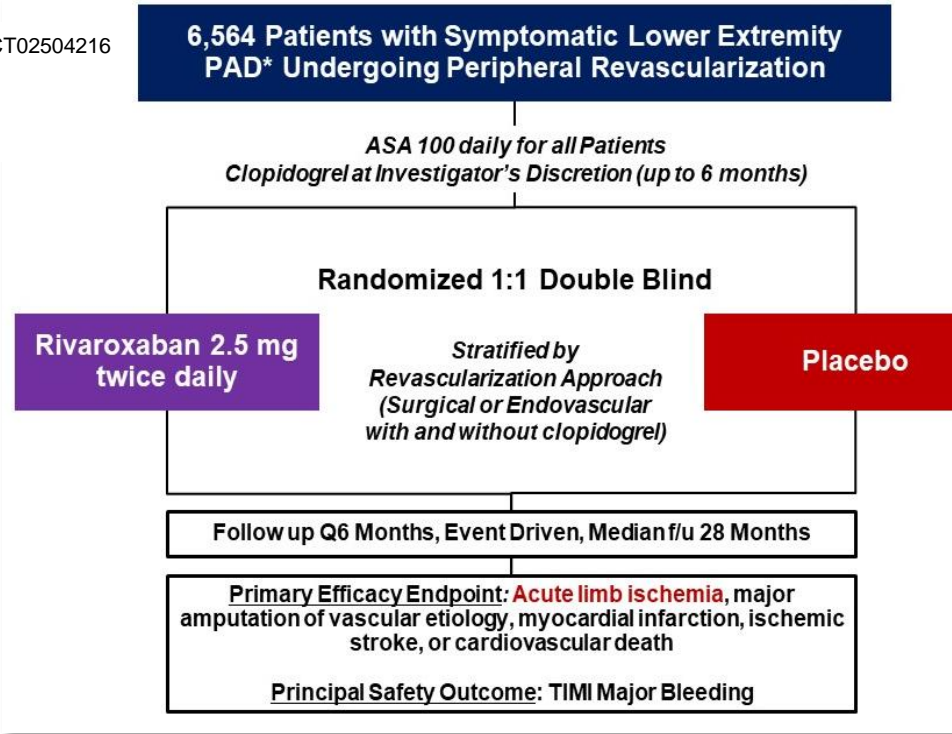
Bradbury et al; Lancet. 2023;401:1798-1809

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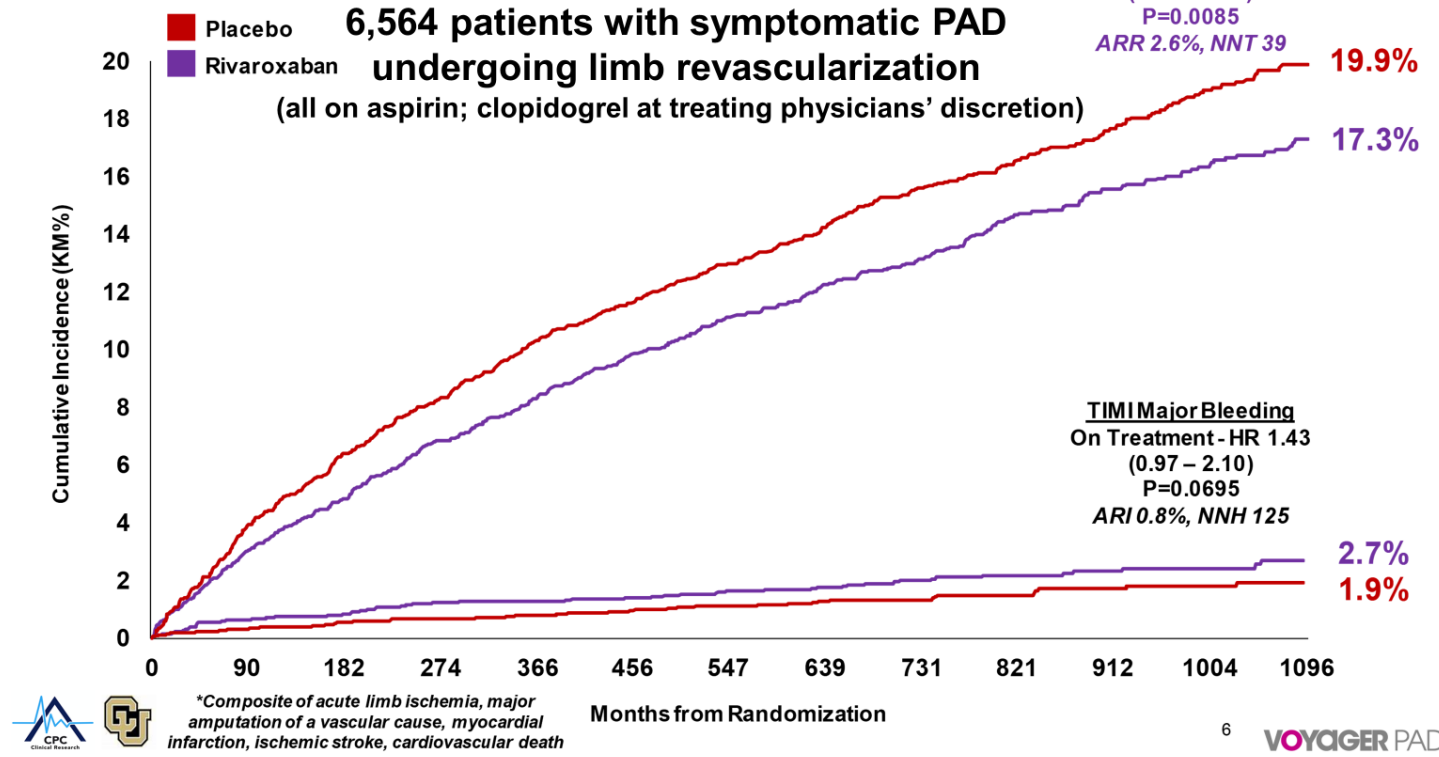


# VOYAGER PAD

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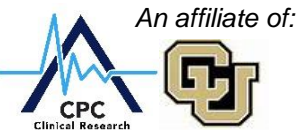


## VOYAGER PAD Primary Results



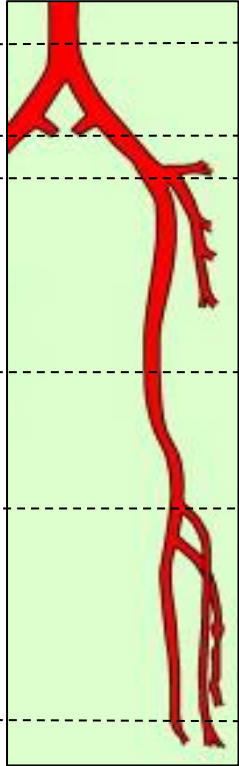
**Independent adjudication of CV outcomes available for analysis**

**1666 angiographic studies (incl. 2646 limbs) were obtained for imaging core lab analysis**



# VOYAGER PAD Angiographic Core Lab

## Anatomic and Flow Characteristics Across 16 Anatomic Segments from 2646 Angiograms



1. Infra-renal abdominal aorta
2. Common iliac
3. External iliac
4. Common femoral
5. Profunda femoral
6. Superficial femoral
7. Popliteal 1
8. Popliteal 2
9. Popliteal 3
10. Anterior tibial
11. Tibioperoneal trunk
12. Peroneal
13. Posterior tibial
14. Lateral plantar
15. Dorsalis pedis
16. Pedal arch

Severity of stenosis  
Length of Disease  
Calcification  
Prior stenting or bypass  
Thrombus  
Aneurysm  
Revascularization

Adjudicated MACE and MALE outcomes and PROs (association with anatomy)

28-months median follow-up

Cross-sectional Analyses

PAD characteristics (Rutherford Category, ABI, CLTI) association with anatomic features

Clinical characteristics (age, sex, diabetes, smoking, CKD) association with anatomic features

# Methods

- **6564 patients undergoing lower extremity revascularization for symptomatic PAD were randomized in VOYAGER PAD and followed for a median of 28 months.**
- **Major Cardiovascular Events (MACE), Major Adverse Limb Events (MALE), and mortality were adjudicated by a blinded CEC.**
- **Angiograms of the index limb were obtained in 1666 participants and scored by trained reviewers.**
- **Baseline characteristics and the risk of MACE, MALE, and mortality were assessed by the presence of BKD versus the lack of BKD.**

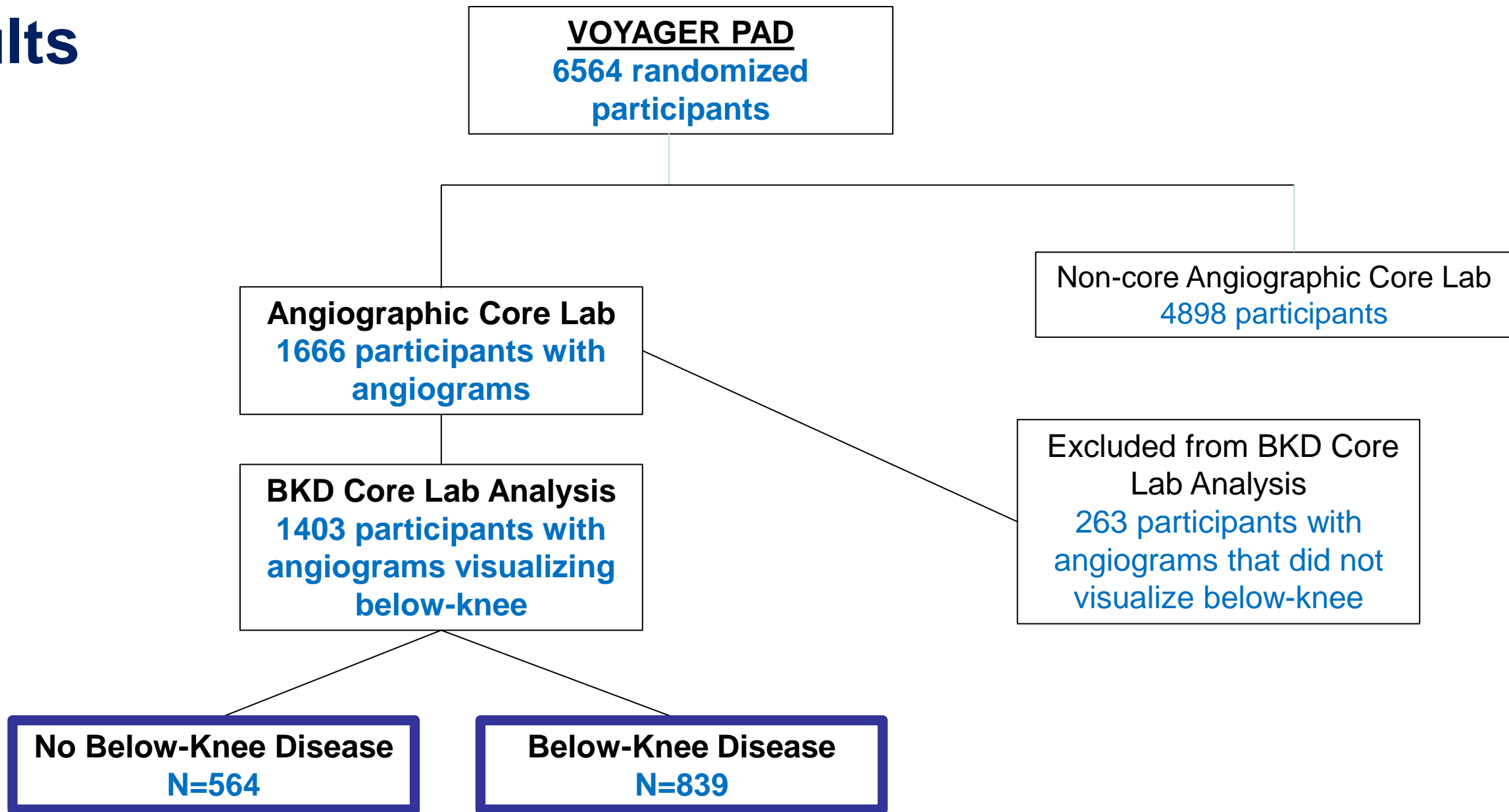


# Definitions

- **MACE = myocardial infarction or CV death**
- **MALE = amputation of vascular cause or acute limb ischemia**
- **Below Knee Disease (BKD) = presence of >50% stenosis in the popliteal 3 segment, tibioperoneal segments, or pedal segments as determined subjectively by the angiographic core lab reader**
- **No BKD = inclusion into VOYAGER-PAD core lab, evaluable angiogram including below-knee segments, but not meeting the criteria for BKD**



# Results



# Results – Baseline Characteristics

Variable	BKD (n=839)	No BKD (n=564)	P value
<b>Age, years mean (SD)</b>	68.0 (8.45)	65.7 (8.05)	<0.01
<b>Sex, female n (%)</b>	223 (26.6)	176 (31.2)	0.06
<b>Race, n(%)</b>			
Asian	54 (6.4)	29 (5.1)	P=0.24
Black/African American	32 (3.8)	23 (4.1)	
White	729 (86.9)	493 (87.4)	
Not reported	24 (2.9)	16 (2.8)	

# Results – Baseline Characteristics

Variable	BKD (n=839)	No BKD (n=564)	P value
<b>Diabetes mellitus, n (%)</b>	399 (47.6)	367 (65.1)	<0.01
<b>Smoking status, n (%)</b>			
Current	296 (35.3)	232 (41.1)	
Former	357 (42.6)	272 (48.2)	<0.01
Never	186 (22.2)	60 (10.6)	
<b>Renal function, n (%)</b>			
eGFR <60 cc/min	196 (23.3)	115 (20.4)	
eGFR ≥60 cc/min	597 (75.3)	414 (78.3)	0.41
<b>LDL, mg/dL</b>			
<b>Mean (SD)</b>	61.2 (56.6)	66.6 (53.8)	0.29

# Results – Baseline Characteristics

Variable	BKD (n=839)	No BKD (n=564)	P value
Rutherford 2 - n (%)	170 (20.3%)	131 (23.2%)	<0.01
Rutherford 3 - n (%)	398 (47.4%)	345 (61.2%)	
Rutherford 4 - n (%)	118 (14.1%)	53 (9.4%)	
Rutherford 5 - n (%)	150 (17.9%)	34 (6.0%)	
Rutherford 6 - n (%)	3 (0.4%)	1 (0.2%)	
History of claudication – n (%)	771 (91.9%)	547 (97.0%)	
History of CLTI – n (%)	321 (38.3%)	115 (20.4%)	<0.01
History of amputation – n (%)	75 (8.9%)	17 (3.0%)	<0.01
Calcification – % of segments Mean (SD)	11.3 (15.2)	6.14 (7.65)	<0.01

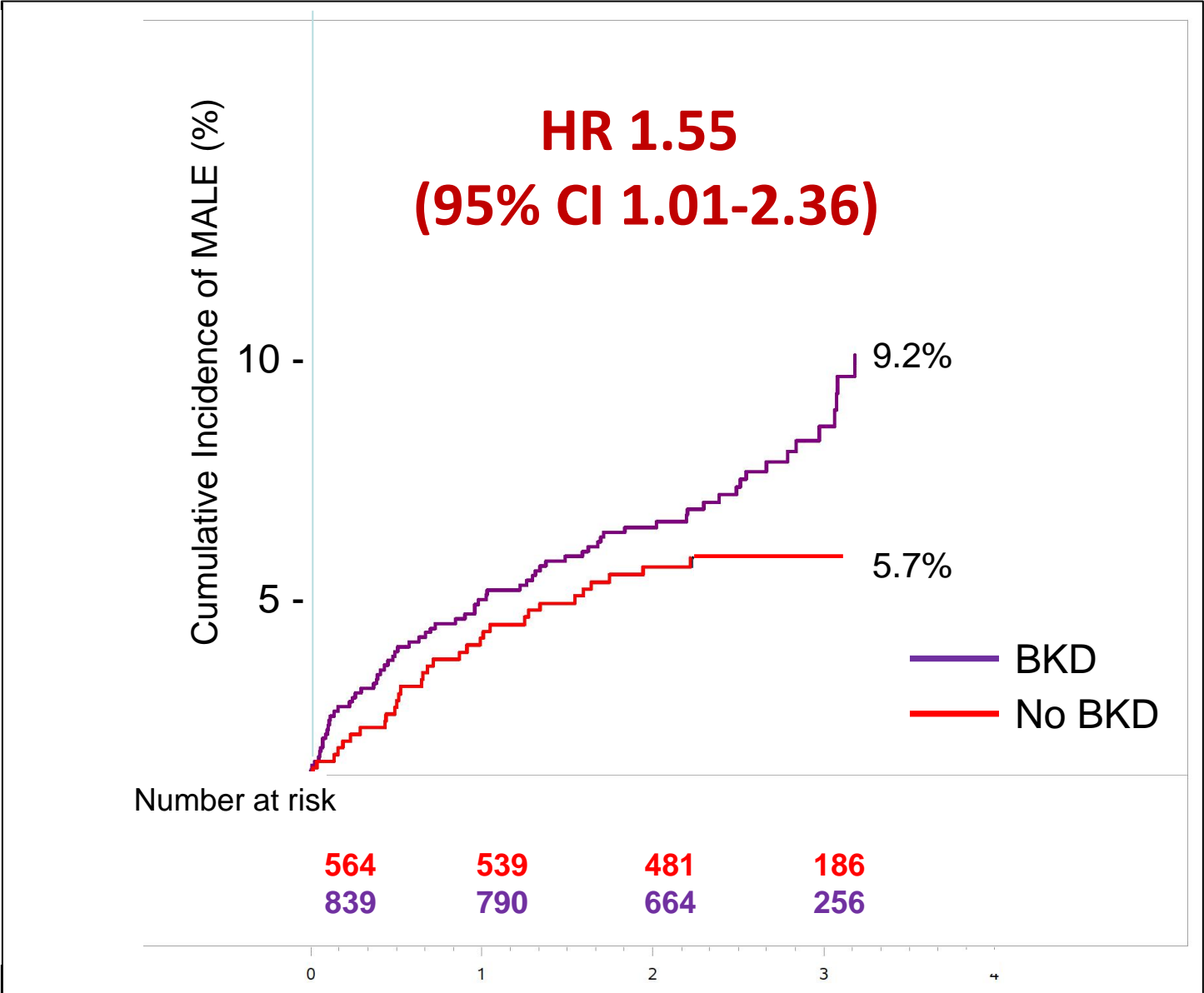
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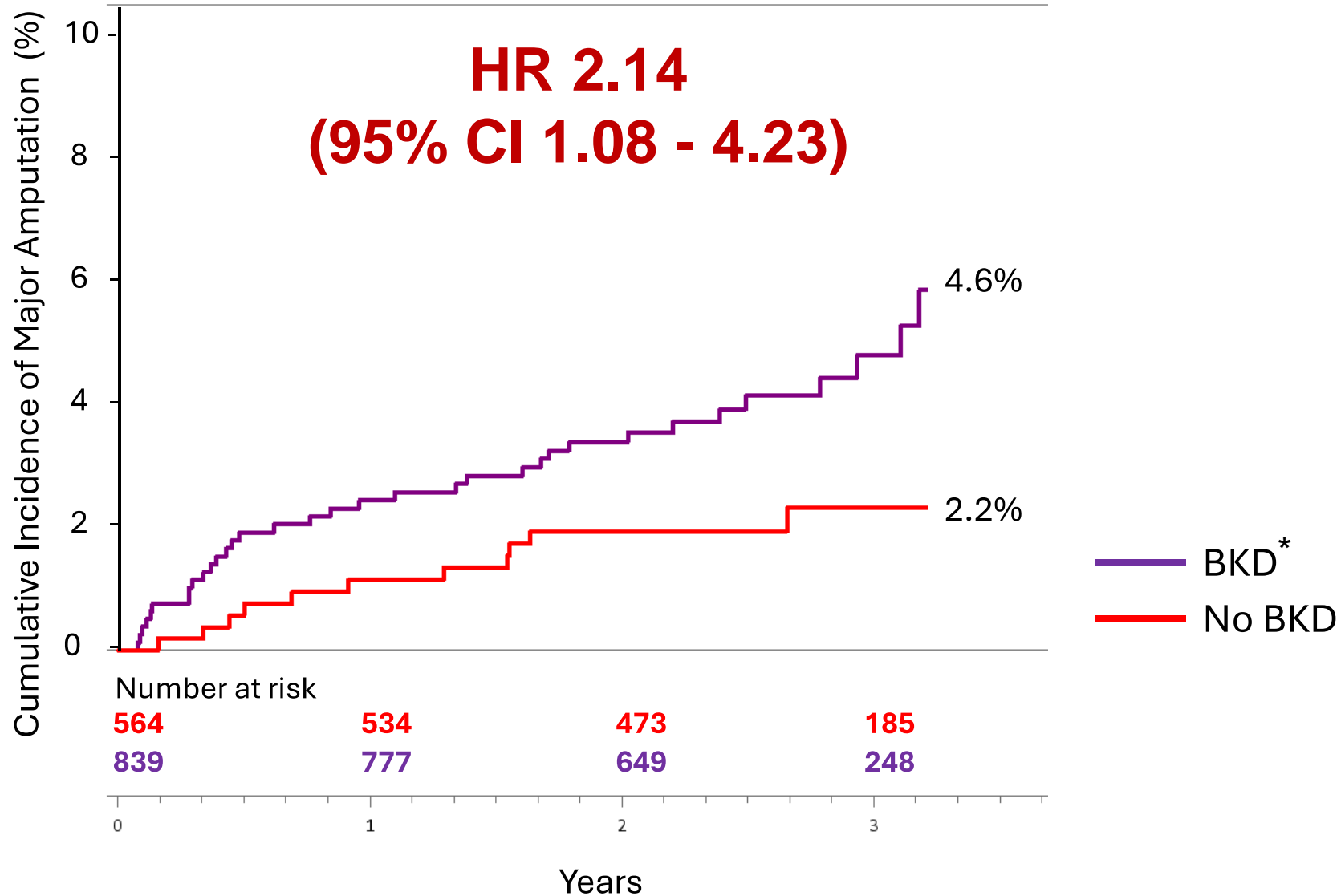
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# Results – MALE





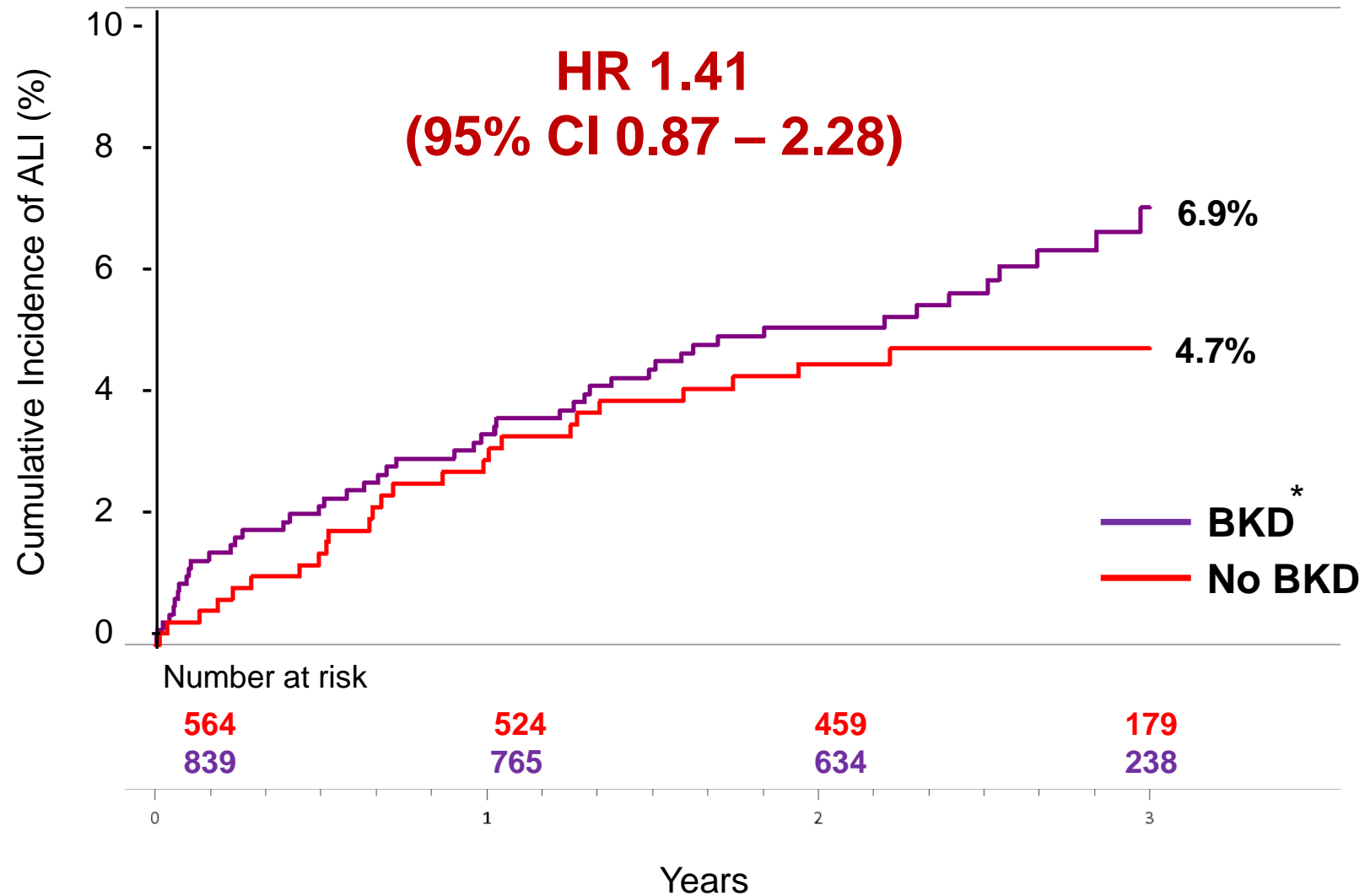
# Results – Major Amputation



\*BKD=Below Knee Disease

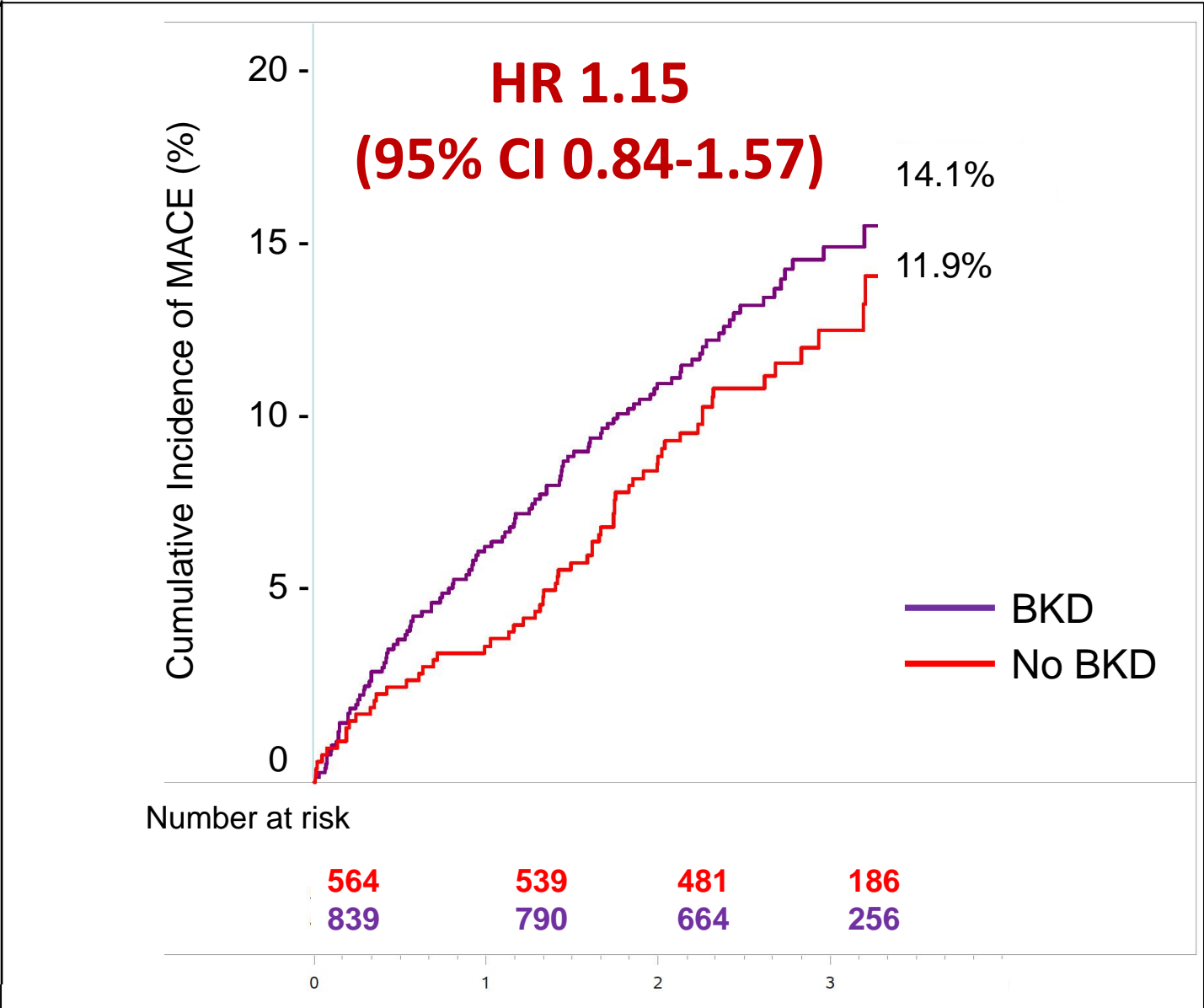


# Results – Acute Limb Ischemia

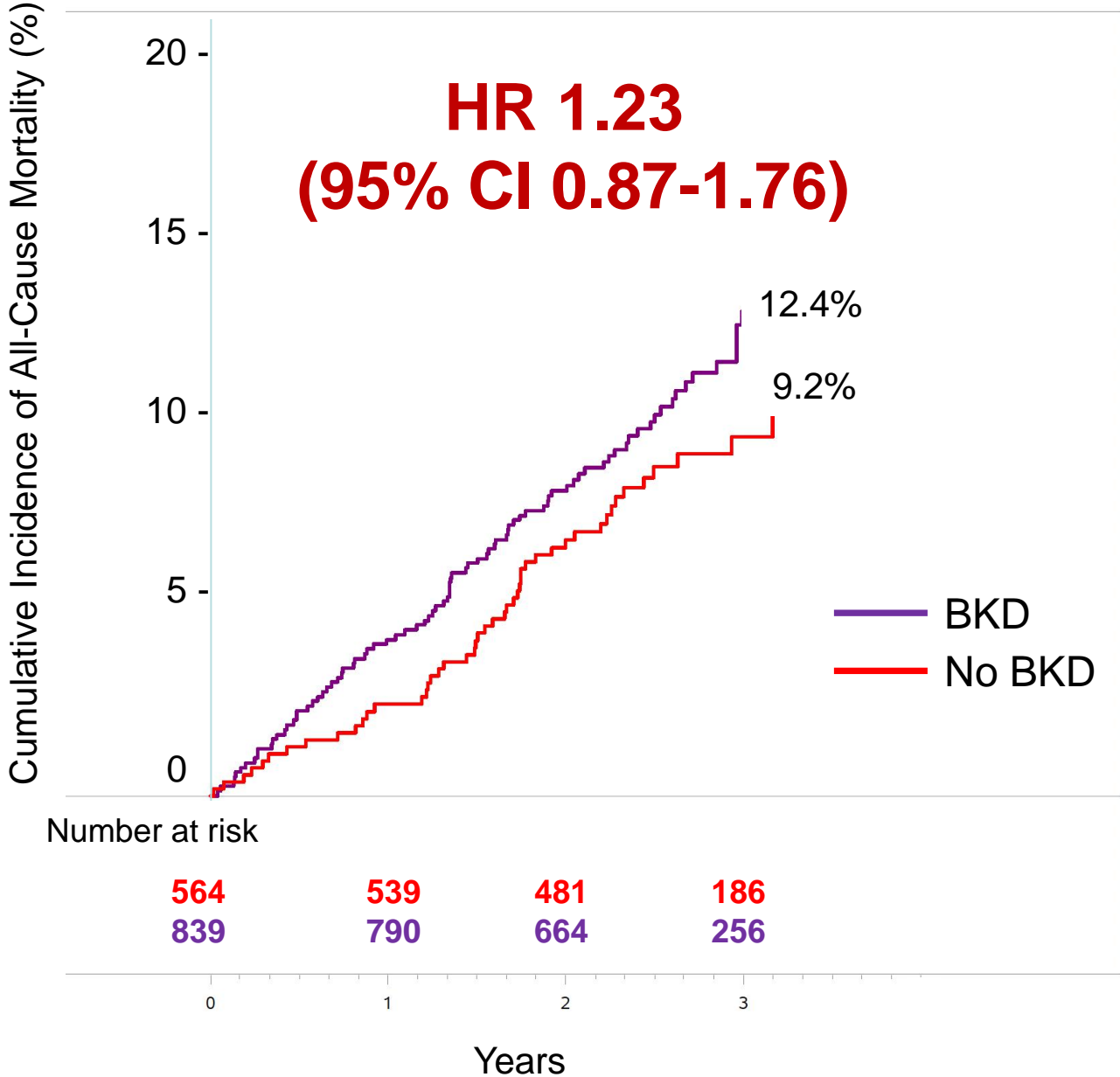


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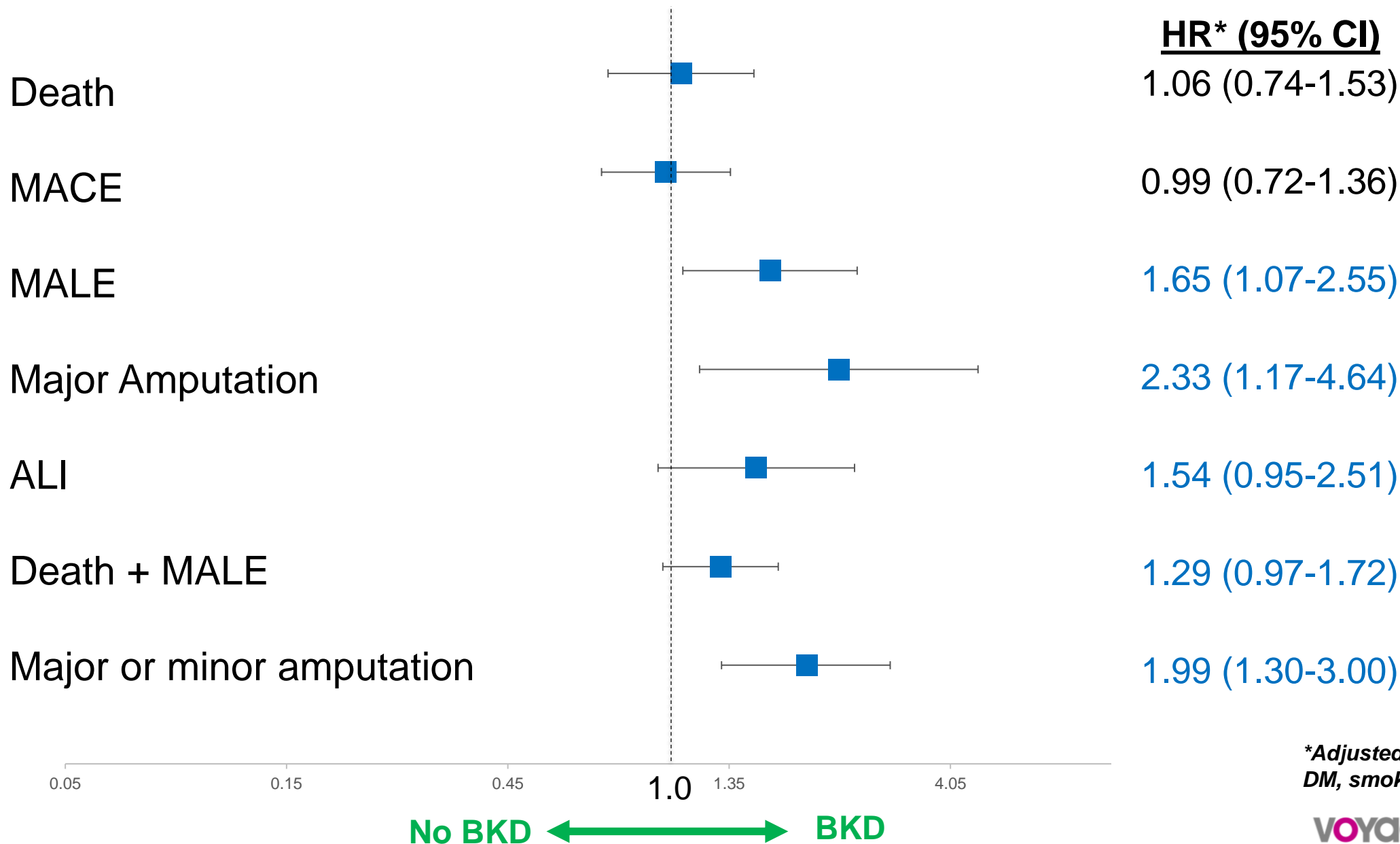
# Results – MACE



# Results – Mortality



# Multivariate Analysis for the Association of BKD and Cardiovascular Outcomes



# Conclusions

- **Prevalence of BKD is higher than 'no BKD' in higher Rutherford categories and those with a history of CLTI and amputation**
- **Surprisingly, the prevalence of diabetes was higher in the BKD group**
- **Patients with BKD are at increased risk of MALE and had numerically higher unadjusted rates of mortality and MACE compared to those without BKD**
- **When adjusting for clinical covariates, BKD was associated with higher risk of MALE and major and minor amputation**
- **The anatomic pattern of BKD can be used to risk stratify PAD patients**