Women's Health Initiative Investigator's Meeting: Early-Stage Investigator Award

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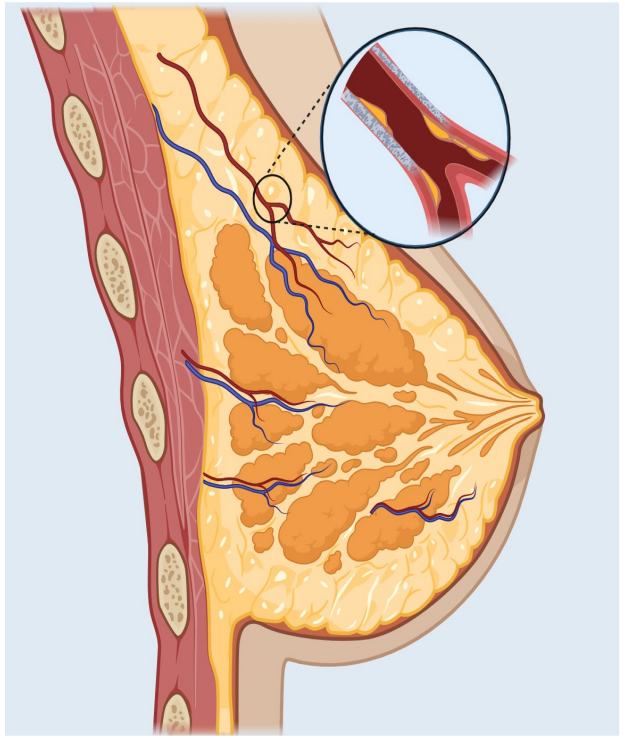
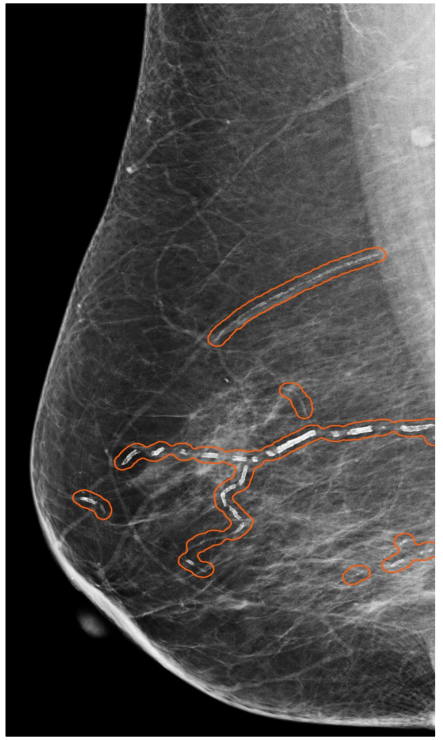
Disclosures

- None

Breast Arterial Calcification (BAC)

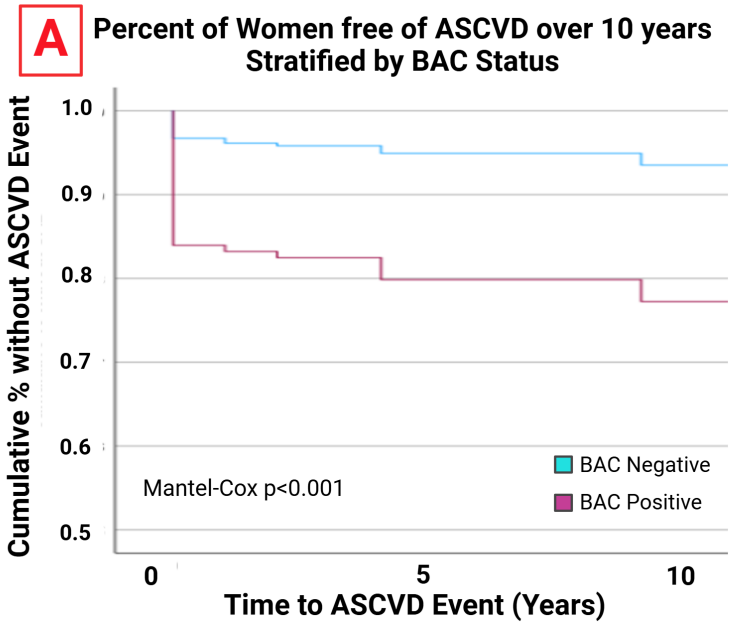
- Medium sized arteries in the breast can become calcified and subsequently visible on mammography
- This is called breast arterial calcification (BAC)
- BAC is not typically reported on radiology reports because there is no known association between BAC and breast cancer
- BAC may be linked to cardiovascular disease





Preliminary Data

- 1,919 women arriving for a screening mammogram
- BAC was associated with a 3-fold increase in coronary artery disease and a 5-fold increase stroke after 10 years of follow-up compared to no BAC
- Limited by self reported outcomes and participants lost to follow-up
- Analyzed only BAC prevalence



Nudy M, Asmaro R, Jiang X, Schnatz PF. The association between incidentally found breast arterial calcification on routine screening mammography and the development of coronary artery disease and stroke: results of a 10-year prospective study. Menopause. 2022 Dec 1;29(12):1375-1380. doi: 10.1097/GME.0000000000002088. Epub 2022 Oct 31. PMID: 36449932.

Breast Arterial Calcification: a Novel Cardiovascular Risk Enhancer Among Postmenopausal Women

Carlos Iribarren, MD, MPH, PhD, Malini Chandra, MS, Catherine Lee, PhD, Gabriela Sanchez, BA, Danny L. Sam, MD, Farima Faith Azamian, MD, Hyo-Min Cho, PhD, Huanjun Ding, PhD, Nathan D. Wong, PhD, and Sabee Molloi, PhD | AUTHOR INFO & AFFILIATIONS

- 5,059 menopausal women included
- BAC was determined by densitometry and BAC mass reported
- Twenty-six percent of women had BAC >0 mg.
- BAC presence was associated with a 1.51 (95% CI, 1.08–2.11; *P*=0.02) increased hazard of ASCVD
- BAC status provided additional risk stratification of the pooled cohorts equations risk. We noted improvements in model calibration and reclassification of ASCVD after adding BAC status.

Iribarren C, Chandra M, Lee C, Sanchez G, Sam DL, Azamian FF, Cho HM, Ding H, Wong ND, Molloi S. Breast Arterial Calcification: a Novel Cardiovascular Risk Enhancer Among Postmenopausal Women. Circ Cardiovasc Imaging. 2022 Mar;15(3):e013526. doi: 10.1161/CIRCIMAGING.121.013526. Epub 2022 Mar 15. PMID: 35290077; PMCID: PMC8931858.

Breast Arterial Calcification (BAC)

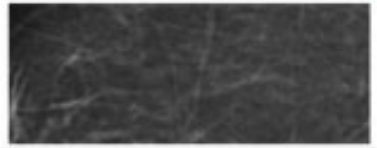
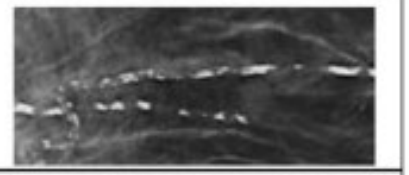
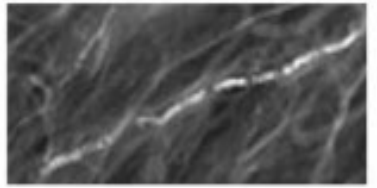
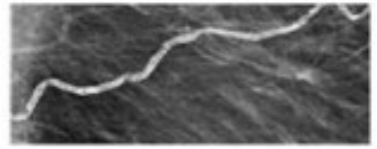
- While there is a growing body of evidence linking BAC to incident cardiovascular disease (CVD) among women….
  - little is known about the relationship between BAC severity, BAC progression, and CVD….

The Women's Health Initiative (WHI)

- Subset of mammograms collected for the Mammogram Density Ancillary Study
- **Breast Arterial Calcification Ancillary Study (PI)**
  - Currently funded through institutional KL2 Career Development Award
- Estrogen and Progestin Clinical Trial (n=413)
  - 413 mammograms were collected an average of 6 months before randomization
  - 413 mammograms were collected at **year 1**
  - 385 mammograms were collected at **year 2**
- Estrogen Alone Clinical Trial (n=435)
  - 435 mammograms were collected an average of 6 months before randomization
  - 435 mammograms were collected at **year 1**
  - 405 were collected at **year 2**

The Women's Health Initiative (WHI)

- Mammograms were digitized on a Lumisys 85 laser digitizer and converted to bitmap at the University of North Carolina
- Recorded on each film was a unique serial number, date, laterality, and view
- Redact patient sensitive data from the images
- 2 blinded, independent radiologists determine BAC prevalence and grade BAC severity (mild, moderate, severe) with disagreements resolved by a 3rd
- Artificial Intelligence software that FDA approved to detect BAC on digital mammograms
  - Retraining this algorithm to create a BAC score

Grade	Criteria	Mammographic Example
0	No arterial calcification seen	
1	Few scattered punctate calcifications	
2	More abundant punctate calcifications or short linear calcifications	
3	Continuous circumferential calcifications	

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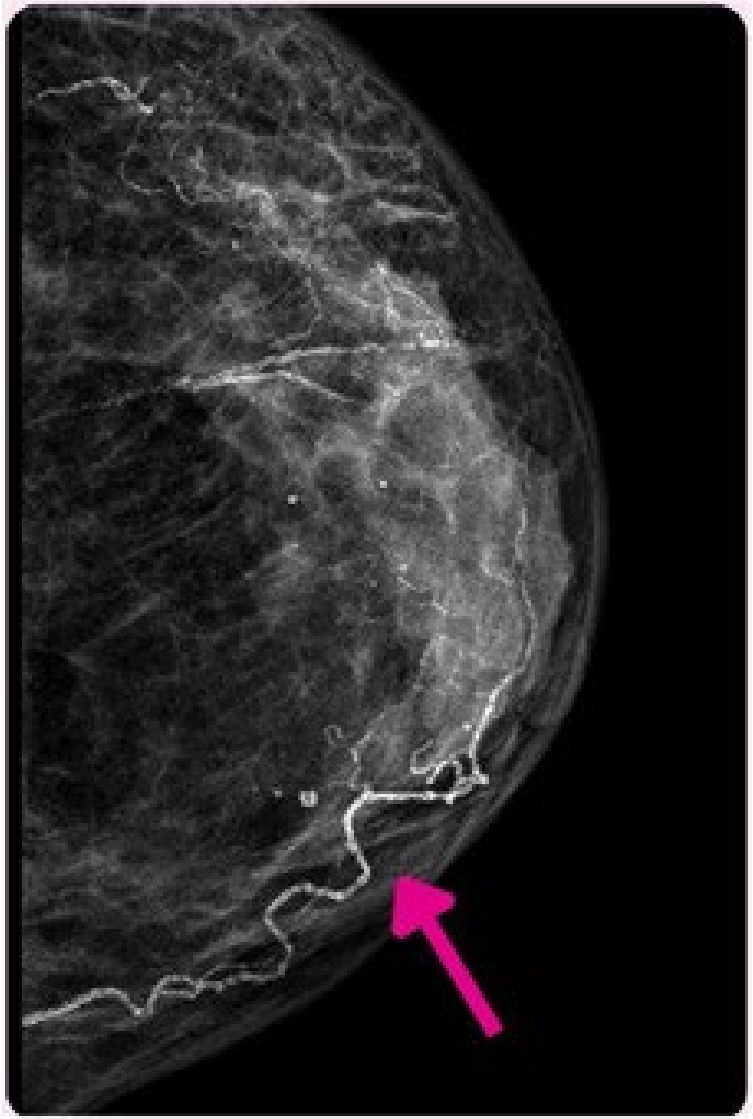
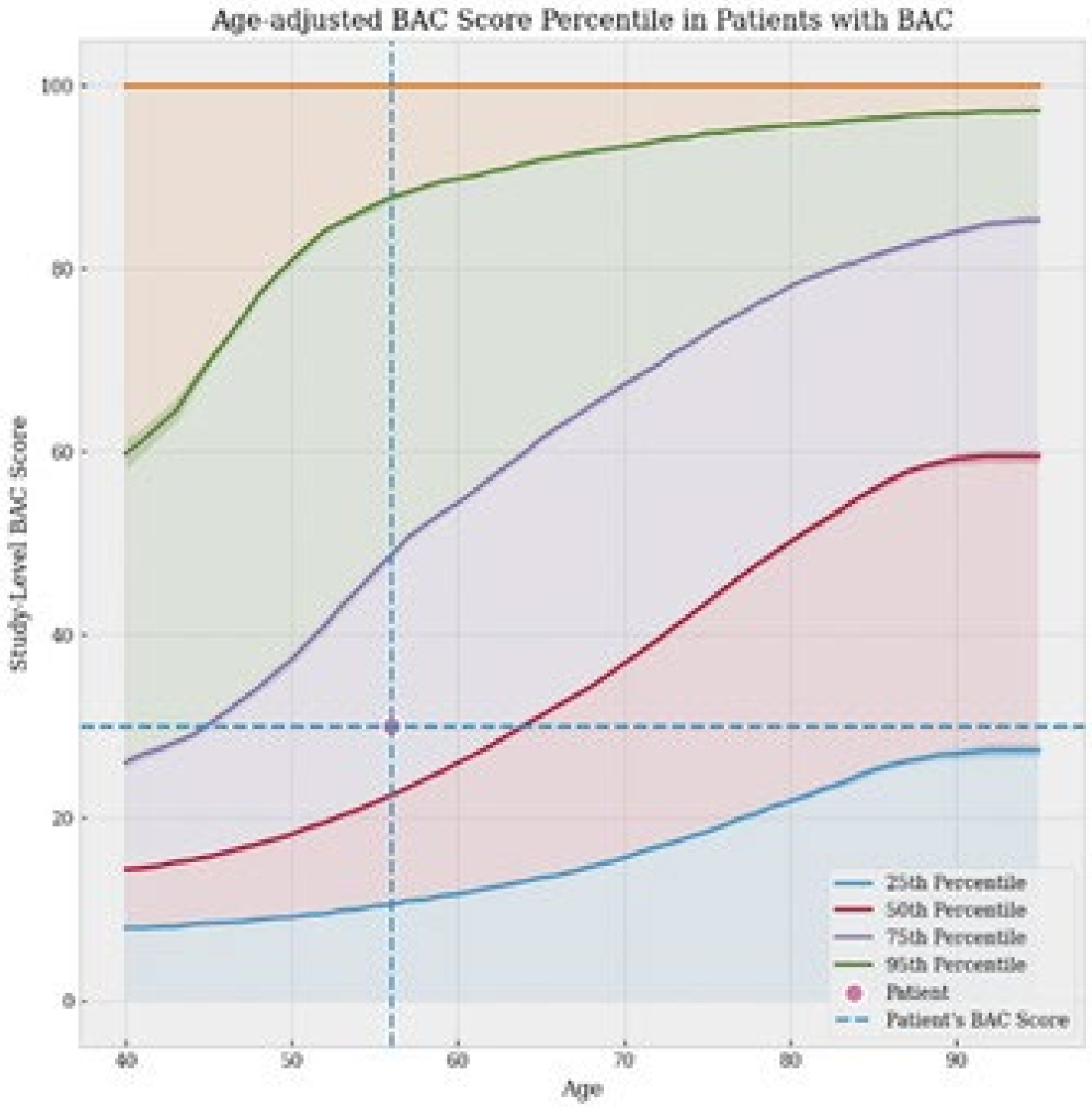
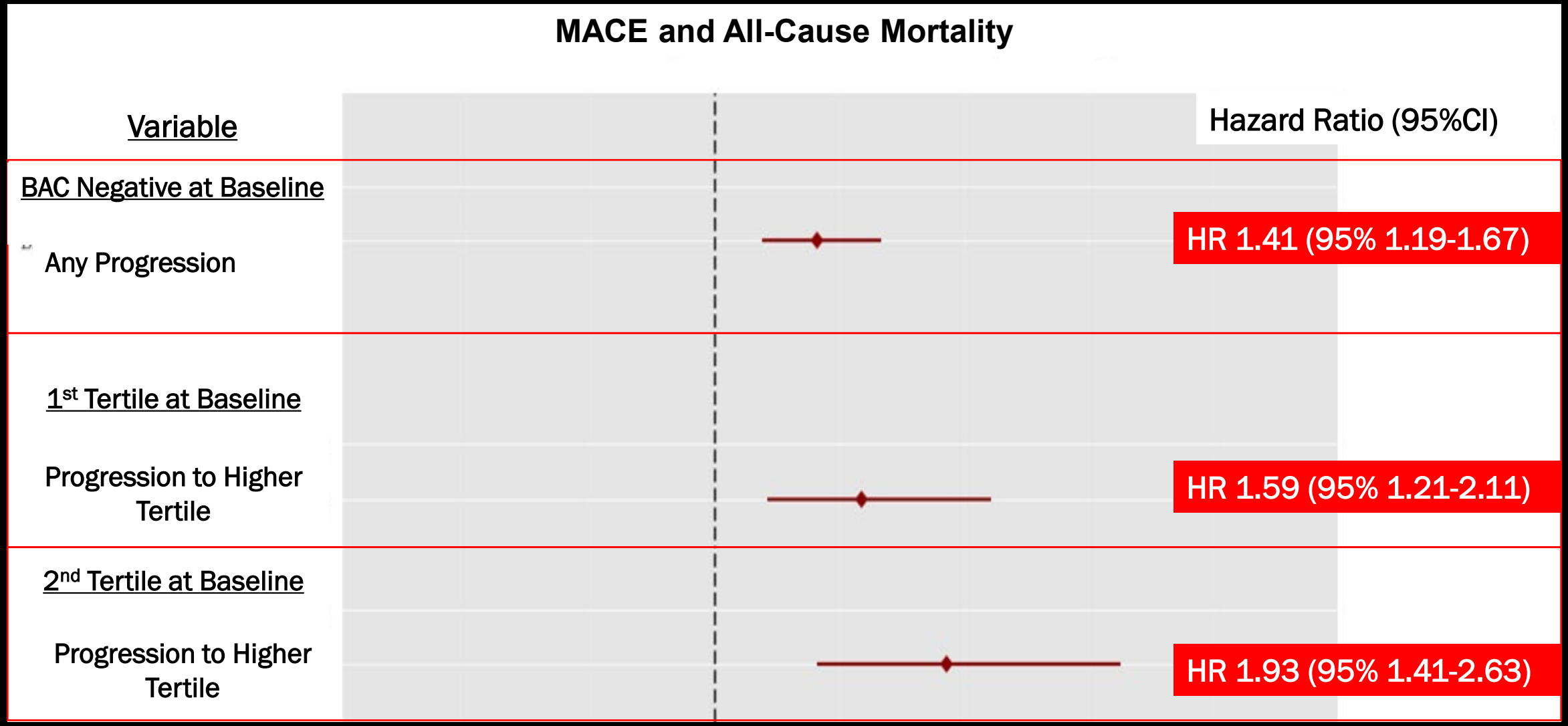




Nerlekar N....Nudy M,...Marwick TH. A Novel Breast Arterial Calcification Age-Based Percentile Nomogram for the Incremental Prediction of Incidental Cardiovascular Events. JACC Cardiovasc Imaging. 2026 Apr 24:S1936-878X(26)00152-X. doi: 10.1016/j.jcmg.2026.03.008. Epub ahead of print. PMID: 42033436.

MACE and All-Cause Mortality



Further Objectives of WHI-Ancillary Study

- Complete radiology reading of WHI images
- Apply validated AI algorithm and age adjusted BAC scores to sequential WHI mammograms
- We will assess for associations between baseline BAC severity and baseline cardiovascular risk factors [hypertension, hyperlipidemia, smoking, obesity, family history of premature cardiovascular disease (CVD), diabetes, age]
  - Using the subsample with serum specimens will assess lipids, C-reactive protein and glucose concentrations (n=549/848, 65%)
  - Medication inventory and self-report of diabetes and hyperlipidemia at baseline will augment CVD risk factors not collected in all participants
- **Exploratory analysis**: assess for associations between baseline BAC severity and incident total CVD (myocardial infarction, stroke, CVD death and coronary revascularization) over 20+ years of follow-up

THANK YOU!

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