

# Serum magnesium and outcomes in patients with heart failure and reduced ejection fraction: insights from the GALACTIC-HF trial

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# Background: serum magnesium in GALACTIC-HF

- Magnesium is one of the most abundant minerals in the body and plays an important role in many physiological processes<sup>1</sup>.
- Low serum magnesium concentrations, thought to reflect tissue depletion, have historically been reported to be common in patients with HF, and are of concern, particularly with regard to the risk of ventricular arrhythmias<sup>2,3</sup>.
- The causes of **HYPO**magnesaemia in HF—including high doses of loop diuretics, digoxin treatment, and hyperaldosteronism—are less frequent today than in the past, (or are blocked e.g., with an MRA)<sup>4</sup>. In addition, SGLT2 inhibitors increase magnesium<sup>5</sup>. So, **HYPO**magnesaemia may be less common in current practice.
- **HYPER**magnesaemia may also be associated with adverse outcomes in HF<sup>6</sup>. However, contemporary, comprehensive analyses of magnesium in HF are lacking.

1. *Nutrients*. 2021;13.    2. *Cardiol Rev*. 2022;30:281-285.    3. *Am Heart J*. 1977;94:600-602.

4. *Am J Cardiol*. 1989;63:39g-42g.    5. *Diabetologia*. 2016;59:2546-2551.    6. *J Am Coll Cardiol*. 1990;16:827-831.

# Objective: serum magnesium in GALACTIC-HF

The aim of this study is to evaluate the prognostic significance of serum magnesium concentrations in outpatients with HFrEF enrolled in the GALACTIC-HF trial<sup>1</sup>.

# Methods: serum magnesium in GALACTIC-HF

## Key inclusion criteria

- LVEF  $\leq$  35%
- NYHA functional class II-IV
- Elevated natriuretic peptide levels
- Inpatient or outpatients with an urgent visit or hospitalization for HF within 1 year prior to screening (this analysis was limited to patients enrolled as outpatients to allow comparison with prior studies).



R

Omecamtiv Mecarbil

Placebo

## Primary endpoint

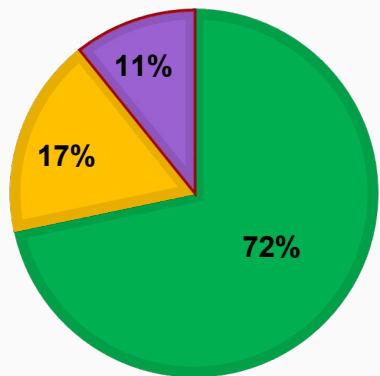
The composite of cardiovascular death or a first HF event (hospitalization or urgent visit for HF).<sup>1</sup>

## Serum magnesium

- Serum magnesium concentrations were measured in a central laboratory.
- The normal range was 0.75–0.95 mmol/L (1.83 mg/dL-2.31 mg/dL)

# Baseline clinical characteristics by magnesium categories

Prevalence of hypomagnesaemia, hypermagnesaemia, and normal magnesium

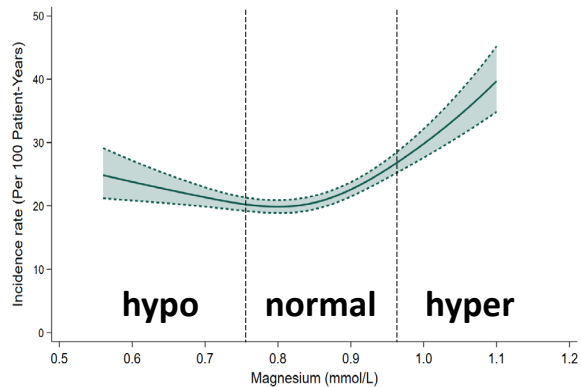


■ Normal magnesium levels (n=4410)  
■ Hypomagnesaemia (n=1082)  
■ Hypermagnesaemia (n=655)

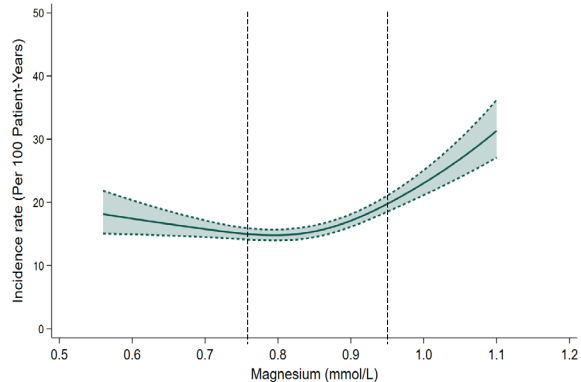
	Hypomagnesaemia <0.75mmol/L (n=1082)	Normal magnesium 0.75-0.95mmol/L (n=4410)	Hypermagnesaemia >0.95mmol/L (n=655)
Age	63.9 ± 10.8	63.8 ± 11.6	68.7 ± 9.9
Sex, female	242 (22%)	952 (22%)	144 (22%)
NYHA III-IV	445 (41%)	1755 (40%)	348 (53%)
SBP (mmHg)	119 ± 15	118 ± 16	113 ± 16
LVEF (%)	26.9 ± 6.1	26.6 ± 6.2	26.2 ± 6.3
NT-proBNP (pg/mL)	1896 (928-3896)	2056 (1027-3751)	2687 (1325-6139)
Potassium (mmol/L)	4.6 ± 0.6	4.6 ± 0.5	4.7 ± 0.6
eGFR (mL/min/1.73m <sup>2</sup> )	63.4 (48.8-79.4)	61.4 (47.5-75.8)	43.8 (33.0-57.1)
Diuretics	948 (88%)	3,891 (88%)	621 (95%)
Digitalis glycoside	177 (16%)	754 (17%)	97 (15%)
MRA	802 (74%)	3,407 (77%)	479 (73%)

# Incidence rates for key clinical outcomes across the spectrum of baseline magnesium concentrations

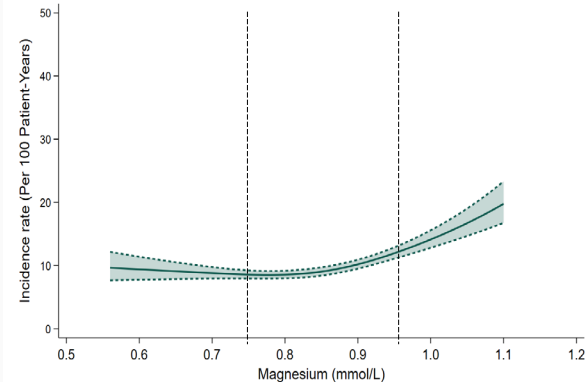
## A Primary outcome



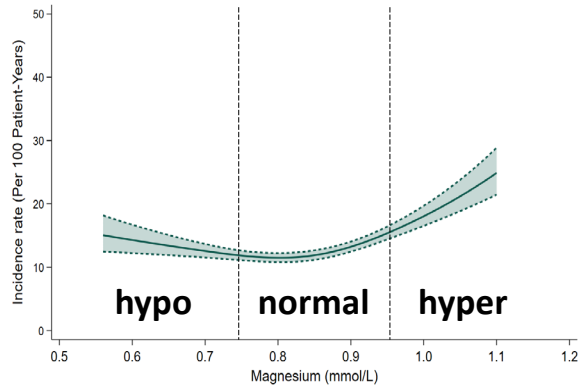
## B First HF event



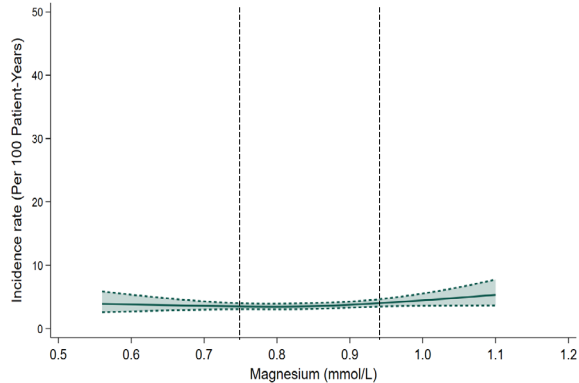
## C Cardiovascular death



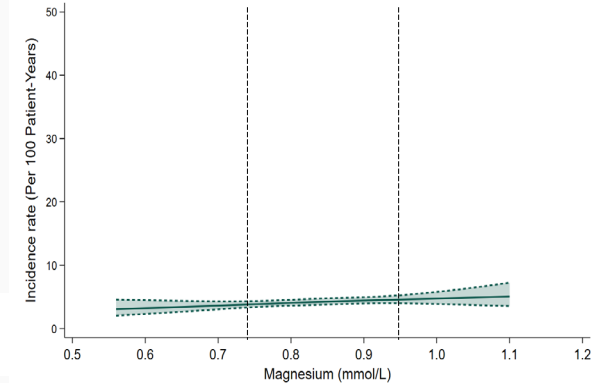
## D All-cause death



## E Sudden death



## F Ventricular tachyarrhythmia



# Conclusions: serum magnesium in GALACTIC-HF

- 17% of outpatients had **HYPO**magnesaemia which was not associated with worse outcomes (including sudden death or ventricular tachyarrhythmias.)
- 11% of outpatients had **HYPER**magnesaemia, which was associated with a higher risk of the primary outcome (and its components) compared to normal magnesium concentrations.
- The effect of OM on clinical outcomes was unaffected by magnesium concentrations.



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*Heart failure and cardiomyopathies*

## Serum magnesium and outcomes in heart failure with reduced ejection fraction: the GALACTIC-HF trial

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