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Cardiac Biomarkers and Malnutrition Incidence in Community-Dwelling Older Adults without Cardiovascular Disease: The Seniors-ENRICA-2 Cohort

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Guest: Blanca Fabre-Estremera is a Specialist in Laboratory Medicine at La Paz University Hospital in Madrid, Spain.

Bob Barrett: This is a podcast from *Clinical Chemistry*, a production of the Association for Diagnostics & Laboratory Medicine. I'm Bob Barrett.

Roughly one in four European older adults are at risk of malnutrition, which is deficient nutrient intake resulting in the loss of body mass, which in turn leads to diminished physical activity, cognitive impairment, falls, and reduced overall quality of life. Recognizing the importance of this issue, clinical guidelines recommend older adults undergo annual nutritional screening to prevent these downstream complications. Cardiovascular disease, another major health concern in older adults, has been associated with malnutrition, but the cause-and-effect relationship remains murky. Does malnutrition cause heart disease, or does heart disease hinder the body's ability to absorb nutrients and maintain muscle mass?

From the clinical laboratory perspective, this cause-and-effect question gives way to another more practical one. Specifically, can measurement of cardiac biomarkers identify malnourished individuals and allow targeted intervention to prevent age-related comorbidities. A new research article, appearing in the April 2025 issue of *Clinical Chemistry*, explores the relationship between cardiac biomarkers and malnutrition, paving the way for laboratorians to help address this growing public health concern.

In this podcast, we are joined by the article's lead author. Blanca Fabre-Estremera is a Specialist in Laboratory Medicine at La Paz University Hospital in Madrid, Spain, with expertise in lipids and cardiac biomarkers. She is currently working on her PhD in cardiac biomarkers at Universidad Autónoma de Madrid with the Cardiovascular and Nutritional Epidemiology research group. So Blanca, let's start here. Could you please start out by just talking about the ENRICA study?

Blanca Fabre Estremera: Well, first, thank you so much for the invitation. The Seniors-ENRICA-2 cohort is an ongoing population-based cohort study of more than 3000 community-dwelling individuals older than

65 years living in the city of Madrid, Spain and four nearby towns. Participants were recruited between December 2015 and June 2017 by sex and district-stratified random sampling. Briefly, computer-assisted telephone interviews were used to obtain information on sociodemographic data, lifestyle behaviors and comorbidities. Two home visits were conducted to collect biological samples, perform a physical examination, and habitual diet. After that, participants were invited to update the study information in 2019. And what is the aim of the ENRICA study? This study aims to assess the frequency and distribution of the main components of the natural history of cardiovascular disease in Spain, including food consumption and other behavioral risk factors, early damage of target organs, and comorbidities. In this study, I'm considering the importance of an adequate nutritional control in older patients with cardiovascular disease. We found interesting to study if subclinical cardiovascular disease in individuals apparently healthy is also related to malnutrition.

Bob Barrett: How did you define subclinical cardiovascular disease and malnutrition in your study?

Blanca Fabre Estremera: First, our independent variable was subclinical cardiovascular disease, which were determined by a blood analysis. Cardiac biomarkers such as high-sensitivity cardiac troponin and natriuretic peptides are useful for the diagnosis and clinical management of myocardial infarction and heart failure, respectively. The key is that these biomarkers are also related to subclinical myocardial damage or dysfunction and indicate cardiovascular risk in apparently healthy subjects. So in this study, we determine subclinical cardiovascular disease by measuring baseline concentrations of high-sensitivity cardiac troponin T and NT-proBNP. Our second dependent variable was malnutrition. The problem here was that malnutrition prevalence depends on the nutritional tools used.

So we decided to assess malnutrition by two different tools commonly used. The first, the Mini Nutritional Assessment—Short Form score, and second the Global Leadership Initiative on Malnutrition assessment. The first tool is a nutritional screening that identified older adults at risk or with a high probability of malnutrition. To diagnose malnutrition, at least one phenotypic and one etiologic criterion are needed. On the one hand, the phenotypic criteria are involuntary weight loss, low body mass index, or low muscle mass, measure on bioelectrical impedance. On the other hand, the etiological criteria are reduced food intake or assimilation, or inflammation.

And with inflammation, we included having an acute illness recently, having chronic diseases related to inflammation such as diabetes, metabolic syndrome, or cancer, or having alternate inflammatory biomarkers such as high-sensitivity C-reactive protein. So what did we hypothesize? Since cardiac biomarkers are potential biomarkers of inflammation in myocardial tissue and inflammation contributes to malnutrition by causing reduced food intake and altering metabolisms, there is interest in the potential of cardiac biomarkers to detect early individuals at high risk of malnutrition.

Bob Barrett: So you found that NT-proBNP concentrations were prospectively associated with malnutrition incidence in community-dwelling older adults without cardiovascular disease, while no association was found for high-sensitivity cardiac troponin T. Was this finding surprising?

Blanca Fabre Estremera: No, this was not unexpected since cardiac troponins and natriuretic peptides have different but complementary characteristics. I mean, cardiac troponins are affected by the mechanism causing myocardial damage, and natriuretic peptides by those causing myocardial expansion. In relation to the natriuretic peptides, natriuretic peptides play a role in contracting the effects of cardiac remodeling. That is to say, a structural and functional change in response to cardiac volume or pressure overload. They result in natriuresis, diuresis, vasodilation, and suppression of renin aldosterone secretion. In an early stage of heart failure, natriuretic peptides play a beneficial role in maintaining homeostasis, but with the deterioration of the cardiac function, they lose efficiency.

According to the last universal definition and classification of heart failure, stage A are those patients at risk for heart failure, and the next step is stage B, which are those without symptoms but with evidence of a structural cardiac change and elevated cardiac biomarkers. Additionally, the European Society of Cardiology recently introduced a new condition known as heart stress to identify asymptomatic individuals with risk factors and elevated natriuretic peptides.

For example, patients at risk of heart failure or heart stress are those with hypertension, diabetes, or obesity. All of them common comorbidities in older adults related to the inflammation. And also, inflammation is related not only to higher risk of heart failure, but also to higher risk of malnutrition.

Bob Barrett: Well, finally, what is the bottom line here? Should we be screening all older adults with natriuretic peptides?

Blanca Fabre Estremera: Well, laboratory medicine can play an integral role in prevention strategies by detecting early high-risk individuals. It helps to deliver preventive interventions before compensatory capacities are exhausted in the organs. Currently, there are clinical guidelines that recommend cardiac biomarkers screening in patients with some conditions. The 2022 guideline of the American Heart Association, the American College of Cardiology, and the Heart Failure Society of Cardiology recommend natriuretic peptides screening in high-risk individuals, including those with hypertension, diabetes, or obesity, which are, as I mentioned it before, common comorbidities in older adults.

Also, the American Diabetes Association recommends the measurement of cardiac biomarkers at least once a year to detect patients at the stage B of heart failure. According to our results, early detection of subclinical cardiac dysfunction offers a promising approach, not only for preventing heart failure, but also for malnutrition. However, further research including randomized controlled trials based on natriuretic peptides screening should confirm our findings, identify underlying biological mechanisms, and determine if preventing intervention can reduce natriuretic peptide concentration and consequently reduce the risk of malnutrition.

Bob Barrett: That was Blanca Fabre-Estremera from the La Paz University Hospital in Madrid, Spain. She authored a research article in the April 2025 issue of *Clinical Chemistry* describing the association between cardiac biomarkers and malnutrition. She's been our guest in this podcast on that topic. I'm Bob Barrett. Thanks for listening.