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EDITORIAL COMMENT

No Standard Risk Factors Is the Marker for Clinical Outcomes in Patients With Myocardial Infarction

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The concept of risk factors for coronary artery disease was advocated by several cohort studies, including the Framingham Heart Study >50 years ago.[1] Since then, modifiable cardiovascular risk factors, including hypertension, diabetes, dyslipidemia, and smoking, have been the therapeutic target for primary and secondary prevention of coronary artery disease.[2,3] The contemporary guidelines for coronary artery disease focus on the modification of risk factors.[4-6] However, recent registry studies revealed that a substantial proportion of patients with acute myocardial infarction (AMI) did not have standard modifiable risk factors (SMuRFs) and that clinical outcomes were worse in patients without modifiable risk factors than in those with modifiable risk factors.[7-9] These findings suggest that patients without modifiable risk factors might have unmodifiable risk factors such as active cancer or chronic systemic inflammatory diseases (CSIDs) and that these unmodifiable risk factors might be the cause of poor outcomes. AMI patients with cancer have apparently worse clinical outcomes, especially all-cause death, than those without cancer.[10,11] Furthermore, AMI patients with CSIDs may have worse clinical outcomes after the hospital discharge.[12]

In this issue of *JACC: Asia*, Yaginuma et al[13] compared major adverse cardiovascular events (MACE) and major bleeding events in patients with AMI among active cancer, CSIDs, no SMuRFs, and SMuRFs. From 4 hospital cohorts, they included 2,480 patients with AMI and divided them into the cancer, CSID, no SMuRFs, and SMuRFs groups. In-hospital MACE were most frequently observed in the no SMuRF group and least frequently in the SMuRFs group. The highest rates of in-hospital MACE in the no SMuRFs group may be explained by the highest rates of cardiogenic shock and cardiac arrest in the no SMuRFs group. In-hospital bleeding events were most frequently observed in the cancer group and least frequently in the SMuRFs group. AMI patients with active cancer, especially gastrointestinal cancer, would have bleeding events under dual antiplatelet therapy and systemic anticoagulation during percutaneous coronary intervention. After discharge, both MACE and bleeding events were most frequently observed in the cancer group and least frequently in the SMuRFs group. Patients with at least one SMuRF who did not have active cancer and CSIDs had the lowest risk of ischemic and bleeding events during hospitalization and after discharge. The unique point of this study is that they clearly separated active cancer, CSIDs, and no SMuRFs. In other words, the no SMuRFs group does not include patients with active cancer or CSIDs. Nevertheless, the clinical outcomes were consistently worse in the no SMuRFs group than in the SMuRFs group. This study suggests that no SMuRFs itself is the risk marker for clinical outcomes in patients with AMI.

If no SMuRFs is the risk marker in patients after AMI, we should carefully follow-up AMI patients without SMuRFs. However, the strategy of secondary prevention has not been established for patients with AMI but without SMuRFs. It is unclear whether these patients require the tighter control of modifiable risk factors such as LDL cholesterol levels <50 mg/dL or systolic blood pressure level <120 mm Hg to prevent adverse events after AMI. In terms of primary prevention, the incidence of coronary artery disease including AMI is apparently lower in the general population without SMuRFs than in those with SMuRFs.[14] Therefore,

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AMI patients without SMuRFs might have any unrecognized risk factor except active cancer or CSIDs. In the long history of risk factors for cardiovascular diseases, no SMuRFs is a relatively new concept, and clinical evidence regarding no SMuRFs is still sparse. Yaginuma et al[13] helped us gain a better understanding of no SMuRFs. Further research is warranted to elucidate the unrecognized risk factors behind no SMuRFs and the strategy of secondary prevention for patients with no SMuRFs.

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REFERENCES

1. Kannel WB, Dawber TR, Kagan A, Revotskie N, Stokes J 3rd. Factors of risk in the development of coronary heart disease—six year follow-up experience. The Framingham study. *Ann Intern Med*. 1961;55:33–50.

2. Lewis CE, Fine LJ, Beddhu S, et al. Final Report of a trial of intensive versus standard blood-pressure control. *N Engl J Med*. 2021;384:1921–1930.

3. Mhaimeed O, Burney ZA, Schott SL, Kohli P, Marvel FA, Martin SS. The importance of LDL-C lowering in atherosclerotic cardiovascular disease prevention: lower for longer is better. *Am J Prev Cardiol*. 2024;18:100649.

4. Byrne RA, Rossello X, Coughlan JJ, et al. 2023 ESC guidelines for the management of acute coronary syndromes. *Eur Heart J*. 2023;44:3720–3826.

5. Writing Committee Members, Virani SS, Newby LK, et al. 2023 AHA/ACC/ACCP/ASPC/NLA/PCNA guideline for the management of patients with chronic coronary disease: a report of the American Heart Association/American College of Cardiology Joint Committee on Clinical Practice Guidelines. *J Am Coll Cardiol*. 2023;82:833–955.

6. Fujiyoshi A, Kohsaka S, Hata J, et al. JCS 2023 guideline on the primary prevention of coronary artery disease. *Circ J*. 2024;88:763–842.

7. Figtree GA, Vernon ST, Hadziosmanovic N, et al. Mortality in STEMI patients without standard modifiable risk factors: a sex-disaggregated analysis of SWEDEHEART registry data. *Lancet*. 2021;397:1085–1094.

8. Sia CH, Ko J, Zheng H, et al. Comparison of mortality outcomes in acute myocardial infarction patients with or without standard modifiable cardiovascular risk factors. *Front Cardiovasc Med*. 2022;9:876465.

9. Saito Y, Inohara T, Kohsaka S, et al. Characteristics and outcomes of patients with no standard modifiable risk factors undergoing primary revascularization for acute myocardial infarction: insights from the nationwide Japanese percutaneous coronary intervention registry. *Am Heart J*. 2023;258:69–76.

10. Dafaalla M, Abdel-Qadir H, Gale CP, et al. Outcomes of ST elevation myocardial infarction in patients with cancer: a nationwide study. *Eur Heart J Qual Care Clin Outcomes*. 2023;9:806–817.

11. Hayashi H, Kataoka Y, Murai K, et al. Cardiovascular and bleeding risks of inactive cancer in patients with acute myocardial infarction who received primary percutaneous coronary intervention using drug-eluting stent and dual/triple antithrombotic therapy. *Cardiovasc Diagn Ther*. 2022;12:803–814.

12. Yaginuma H, Saito Y, Sato T, et al. Clinical characteristics and outcomes of patients with chronic systemic inflammatory disease in acute myocardial infarction. *PLoS One*. 2023;18:e0289794.

13. Yaginuma H, Saito Y, Goto H, et al. Impact of cancer, inflammation, and no standard risk factors in patients with myocardial infarction. *JACC Asia*. 2024;4(7):507–516.

14. Grundy SM, Balady GJ, Criqui MH, et al. Primary prevention of coronary heart disease: guidance from Framingham: a statement for healthcare professionals from the AHA Task Force on Risk Reduction. American Heart Association. *Circulation*. 1998;97:1876–1887.

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