

Granulocyte-colony Stimulating Factor-induced Bone Marrow Enhancement at MRI in a Breast Cancer Patient

Hye Jung Kim

Department of Radiology, School of Medicine, Kyungpook National University, Kyungpook National University Chilgok Hospital, Daegu, Korea

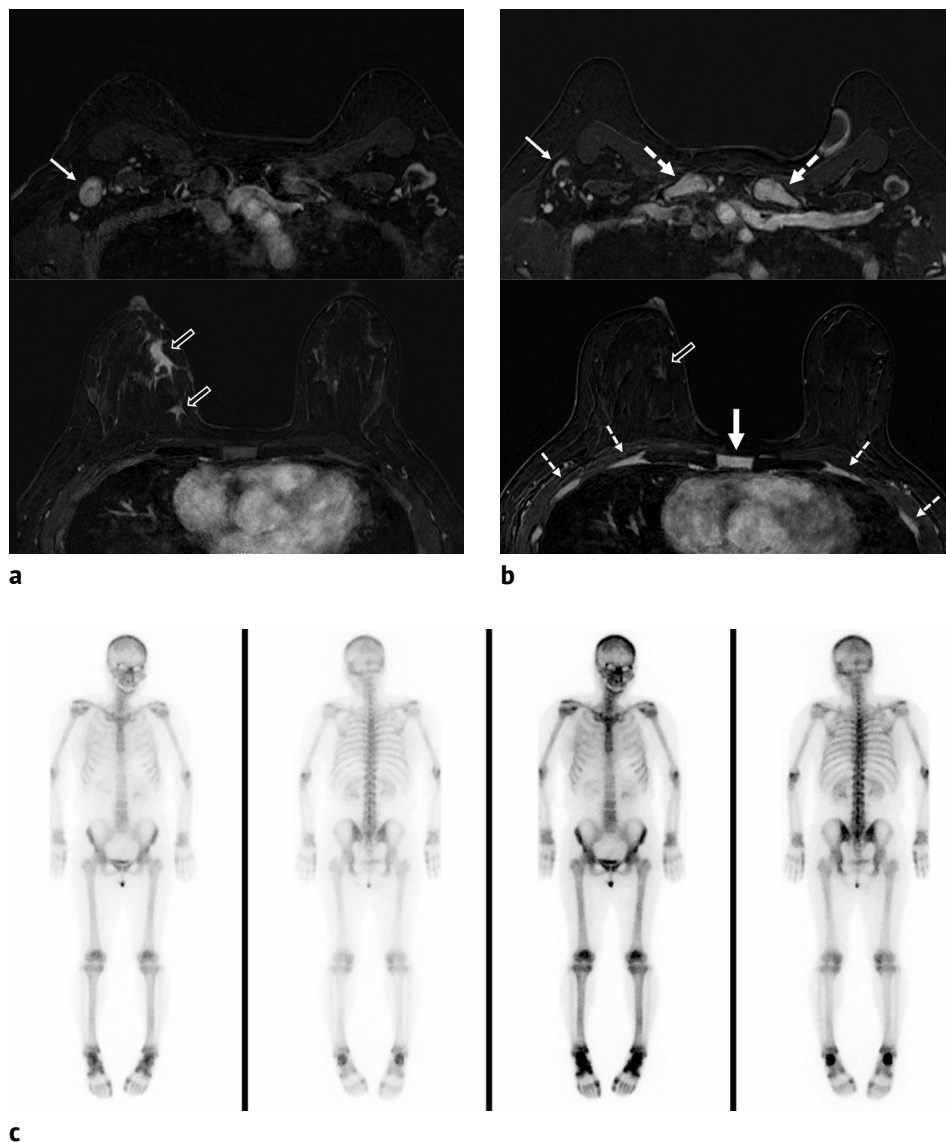


Fig. 1. 48-year-old woman diagnosed with invasive ductal carcinoma. She received neoadjuvant chemotherapy (NAC) with adjunct G-CSF. **a.** Initial MRI shows multiple malignant masses (open arrows) and a metastatic axillary lymph node (thin white arrow) on contrast-enhanced T1-weighted subtraction images. **b.** After completion of NAC, MRI was performed 3 days following G-CSF injection. On MRI, the previous malignant lesion shows subtle focal enhancement (open arrow), and the metastatic lymph node has normalized (thin white arrow). However, diffuse bone marrow enhancement involving the clavicle (thick dashed arrows), sternum (thick white arrow) and bilateral ribs (thin dashed arrows) is observed on contrast-enhanced T1-weighted subtraction images. **c.** A bone scan performed at the 6-month follow-up shows no evidence of metastasis.

G-CSF, Granulocyte-colony stimulating factor; NAC, neoadjuvant chemotherapy.

Corresponding Author: Hye Jung Kim

Department of Radiology, School of Medicine, Kyungpook National University, Kyungpook National University Chilgok Hospital 807, Hoguk-ro, Buk-gu, Daegu 41404, Korea

Tel. +82-53-200-7390 Fax. +82-53-200-7933

E-mail: mamrad@knu.ac.kr

Case

A 48-year-old woman with invasive ductal carcinoma (estrogen receptor positive, progesterone receptor positive, HER2 negative, and Ki-67 26.1%) and axillary metastasis underwent neoadjuvant chemotherapy (NAC). Initial MRI revealed multiple suspicious masses in the right breast and suspicious axillary lymph nodes (Figure 1A). Following completion of NAC, MRI showed diffuse bone marrow enhancement involving the clavicle, sternum and bilateral ribs on contrast-enhanced T1-weighted images (Figure 1B). Three days prior to the MRI, the patient received granulocyte-colony stimulating factor (G-CSF) to reduce the risk of neutropenia. She underwent breast-conserving surgery with axillary sampling. Final pathology revealed multifocal invasive ductal carcinoma with a total extent of 2.5 cm and a histologic grade of 2. Among the 8 removed axillary lymph nodes, one showed metastasis. A bone scan performed at the 6-month follow-up showed no evidence of

metastasis (Figure 1C).

G-CSF promotes increased bone marrow activity and triggers a shift from fatty to cellular marrow composition. This process can appear as focal areas of hematopoietic marrow expansion or, in some cases, as a more uniform, diffuse pattern (1). Evaluating serial MRI changes in relation to G-CSF administration can help differentiate between benign marrow reconversion and pathological involvement (2).

References

1. Gu L, Madewell JE, Aslam R, Mujtaba B. The effects of granulocyte colony-stimulating factor on MR images of bone marrow. *Skeletal Radiol.* 2019 ;48(2):209-218.
2. Sorin V, Bokov I, Haisraely O, Ben-David MA, Faermann R, Sklair-Levy M. Treatment-Induced Bone Marrow Enhancement at MRI in Breast Cancer Patients Receiving Granulocyte-Colony Stimulating Factor Adjunct to Chemotherapy. *Acad Radiol.* 2023;30 Suppl 2:S9-S15.