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# Two Cases of Decreased $^{123}\text{I}$ -Metaiodobenzylguanidine Lung Uptake in Metaiodobenzylguanidine Scintigraphy While Taking Selective Serotonin Reuptake Inhibitor/Serotonin Noradrenaline Reuptake Inhibitor

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**Abstract:**  $^{123}\text{I}$ -metaiodobenzylguanidine scintigraphy is used to differentiate Lewy body disease from other neurodegenerative disorders. We identified 2 cases with remarkably changed pulmonary uptake between 2 metaiodobenzylguanidine scintigraphies; pulmonary uptake was reduced when patients were taking selective serotonin reuptake inhibitor/serotonin noradrenaline reuptake inhibitor and preserved during the medication-naive or withdrawal state, suggesting that pulmonary uptake involves not only the noradrenaline transporter, but also the serotonin transporter. Pulmonary accumulation may affect the heart-to-mediastinum ratio as the region of interest on the planner image is usually placed on the heart and includes part of the lung. Therefore, we should pay attention to the medication state of patients with decreased pulmonary uptake.

**Key Words:**  $^{123}\text{I}$ -MIBG scintigraphy, Lewy body disease, parkinsonism, SNRI, SSRI

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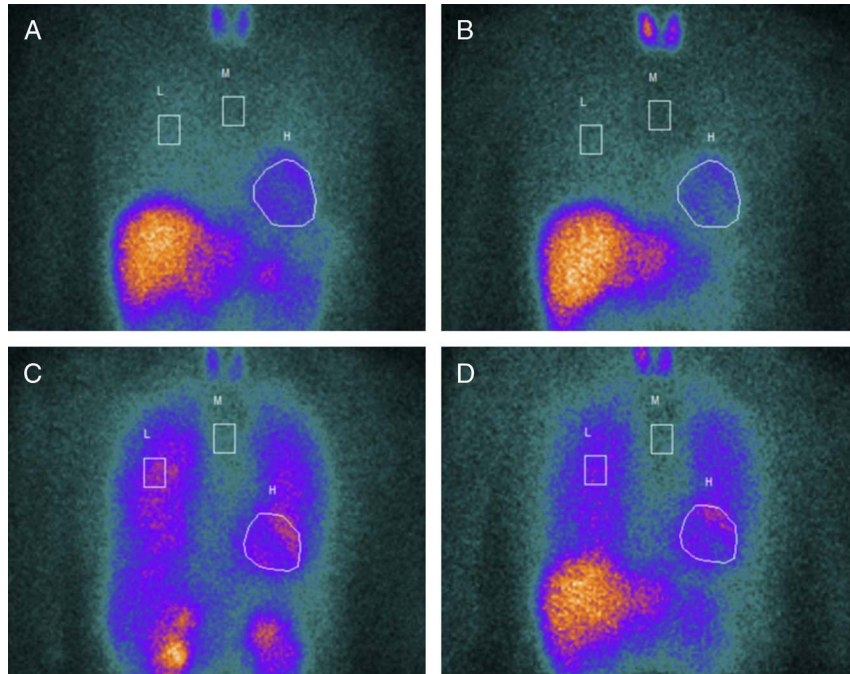
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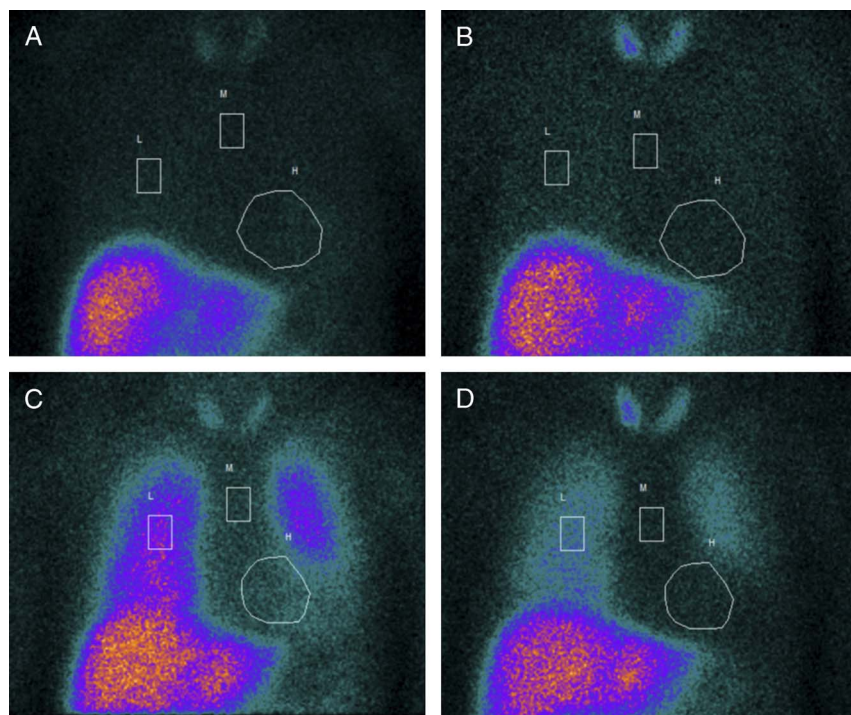
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## REFERENCES

- Orimo S, Ozawa E, Nakade S, et al. (123)I-metaiodobenzylguanidine myocardial scintigraphy in Parkinson's disease. *J Neurol Neurosurg Psychiatry*. 1999;67:189–194.
- Kitagawa Y. Usefulness of [ $^{123}\text{I}$ ] MIBG myocardial scintigraphy for differential diagnosis of Alzheimer's disease and dementia with Lewy bodies. *Intern Med*. 2003;42:917–918.
- Courbon F, Brefel-Courbon C, Thalamos C, et al. Cardiac MIBG scintigraphy is a sensitive tool for detecting cardiac sympathetic denervation in Parkinson's disease. *Mov Disord*. 2003;18:890–897.
- Wieland DM, Wu J, Brown LE, et al. Radiolabeled adrenergic neuron-blocking agents: adrenomedullary imaging with [ $^{131}\text{I}$ ]iodobenzylguanidine. *J Nucl Med*. 1980;21:349–353.
- Tobes MC, Jaques S Jr, Wieland DM, et al. Effect of uptake-one inhibitors on the uptake of norepinephrine and metaiodobenzylguanidine. *J Nucl Med*. 1985;26:897–907.
- Sisson JC, Wieland DM, Sherman P, et al. Metaiodobenzylguanidine as an index of the adrenergic nervous system integrity and function. *J Nucl Med*. 1987;28:1620–1624.
- Orimo S, Amino T, Itoh Y, et al. Cardiac sympathetic denervation precedes neuronal loss in the sympathetic ganglia in Lewy body disease. *Acta Neuropathol*. 2005;109:583–588.
- Castro EC, Sen P, Parks WT, et al. The role of serotonin transporter in human lung development and in neonatal lung disorders. *Can Respir J*. 2017; 2017:9064046.
- Yokoyama K, Yamada T, Terachi S, et al. Milnacipran influences the indexes of I-metaiodobenzylguanidine scintigraphy in elderly depressed patients. *Psychiatry Clin Neurosci*. 2014;68:169–175.



**FIGURE 1.** A 68-year-old woman presented with gait disturbance and depression. She was referred to our department with suspicion of Lewy body disease and subsequently underwent  $^{123}\text{I}$ -metaiodobenzylguanidine (MIBG) scintigraphy to diagnose her condition.<sup>1–3</sup> Metaiodobenzylguanidine accumulation was measured by setting regions of interest on the anterior view of the early image (A) and the delay image (B). Heart-to-mediastinum (H/M) ratio was 2.10, and lung-to-mediastinum (L/M) ratio was 1.18 in the early image. Washout rate (WR) in the myocardium was 20.5%. In the early and delay images, MIBG accumulation was lacking only in the lung, whereas cardiac accumulation was maintained. We confirmed her medication state and medical history and found that she was undergoing treatment with selective serotonin reuptake inhibitor (SSRI; paroxetine) 10 mg/d at the time of MIBG scintigraphy. Three years ago, she had undergone MIBG scintigraphy for the same symptoms prior to SSRI treatment, in which H/M and L/M ratios at the early image were 2.20 and 2.32, respectively, and WR was 27.7%. The MIBG scintigraphy from 3 years prior showed that the accumulation in the lung and heart was preserved in both the early (C) and delay images (D). Metaiodobenzylguanidine, an analog of norepinephrine (NE), is taken up by the NE transporter, but, unlike NE or epinephrine, is not metabolized and therefore accumulates in the sympathetic nerve terminal, innervating the heart.<sup>4–6</sup> Thus, MIBG uptake in the heart can reflect actual cardiac sympathetic denervation.<sup>7</sup> Typically, in patients with Lewy body disease, MIBG scintigraphy shows decreased cardiac uptake of MIBG, whereas the pulmonary physiological uptake is preserved.



**FIGURE 2.** A 75-year-old man presented with gait disturbance. At the first  $^{123}\text{I}$ -metaiodobenzylguanidine scintigraphy, serotonin noradrenaline reuptake inhibitor (SNRI; duloxetine) 20 mg/day was prescribed for his back pain. Metaiodobenzylguanidine accumulation in the heart and the lung was decreased at the early (A) and delay images (B). The H/M and L/M ratios at the early image were 1.29 and 1.27, respectively, and WR in the myocardium was 89.9%. Two months later, reexamination was performed after a 5-day withdrawal of duloxetine. The H/M and L/M ratios at the early image were 1.44 and 4.28, respectively, and WR was 83.2%. Pulmonary accumulation was preserved in the early (C) and delay images (D). Both our cases showed no chest disease and no abnormalities on the chest x-ray examination. The pulmonary physiological uptake of metaiodobenzylguanidine might be inhibited by SSRI or SNRI. In fact, it has been elucidated that the serotonin transporter is expressed specifically in pulmonary endothelial cells in normal lungs.<sup>8</sup> In addition, it has been reported that patients taking SNRI (milnacipran) may have reduced cardiac accumulation.<sup>9</sup> In order to avoid these effects, drug withdrawal should be considered carefully, with concern for the disease status, in patients being treated with SSRI or SNRI drugs.