

# World Journal of *Clinical Cases*

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## Incidental accumulation of Technetium-99m pertechnetate in subacute cerebral infarction: A case report

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### Abstract

#### BACKGROUND

When interpreting nuclear medicine images, unexpected findings are sometimes encountered. Recognizing these findings and determining the mechanism of their occurrence could have a significant impact on early diagnosis of critical diseases and the appropriate management of patients.

#### CASE SUMMARY

A 59-year-old man was admitted to the emergency room due to left hemiparesis, left hemifacial palsy, and mild dysarthria. After 2 wk of hospitalization, the patient complained of dry eyes and mouth. Thus, salivary scintigraphy was performed to evaluate the functional status of his salivary glands. Incidental accumulation in the right frontoparietal area was found on salivary scintigraphy. Fluid-attenuated inversion recovery phase magnetic resonance (FLAIR phase MR) image showed diffuse high signal intensity in the same area. Anterior and posterior horns of the right lateral ventricle were obliterated and the midline was slightly shifted to the left side due to right frontoparietal swelling. On salivary scintigraphy, Tc-99m pertechnetate was incidentally accumulated in a subacute cerebral infarction lesion. Two years after the diagnosis of acute infarction, the second series of salivary scintigraphy showed no abnormal activity in the brain. FLAIR phase MR image also demonstrated markedly decreased high signal intensity in the previous infarction lesion without evidence of swelling indicating chronic cerebral infarction.

#### CONCLUSION

This case highlights that Tc-99m pertechnetate could accumulate in a subacute

cerebral infarction lesion. The mechanism of an unexpected uptake of Tc-99m pertechnetate in unusual sites should be evaluated and kept in mind for better interpretation.

**Key Words:** Cerebral infarction; Tc-99m pertechnetate; Salivary scintigraphy; Case report

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**Core Tip:** Tc-99m pertechnetate is a truly carrier-free radiotracer transported by sodium iodide symporter. Salivary scintigraphy using Tc-99m pertechnetate is frequently performed for diagnosing salivary gland diseases such as Sjogren's syndrome. Here, we present a rare case of Tc-99m pertechnetate accumulation in the subacute cerebral infarction lesion. The reason for Tc-99m pertechnetate accumulation is thought to be due to ingrowth and proliferation of new capillaries with enhanced permeability in the subacute cerebral infarction lesion. The present case highlights that Tc-99m pertechnetate could accumulate in a subacute cerebral infarction lesion. The mechanisms of an unexpected uptake of Tc-99m pertechnetate in unusual sites should be evaluated and kept in mind for better interpretation.

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## INTRODUCTION

When interpreting nuclear medicine images, unexpected findings are sometimes encountered. Recognizing these findings and determining the mechanism of their occurrence could have a great impact on early diagnosis of critical disease and appropriate management of patients. Tc-99m pertechnetate is one of the most common and widely used radiotracers in the nuclear medicine department. Although it is mostly used in combination with other pharmaceuticals, free Tc-99m pertechnetate itself is also used to evaluate thyroid and salivary gland function and to detect ectopic gastric mucosa in Meckel's diverticulum. Salivary scintigraphy using Tc-99m pertechnetate provides a series of processes in which saliva is produced and excreted. Therefore, it can evaluate saliva production and excretory functions of major salivary glands such as the parotid and submandibular glands in various salivary gland diseases such as radiation sialoadenitis and Sjogren's syndrome. Here, we present the first case of a subacute cerebral infarction demonstrating an unexpected uptake of Tc-99m pertechnetate on salivary scintigraphy.

## CASE PRESENTATION

### Chief complaints

A 59-year-old man was admitted to the emergency room because of left hemiparesis, left hemifacial palsy, and mild dysarthria.

### History of present illness

After 2 wk of hospitalization, the patient's symptoms of dry eyes and mouth started and worsened as time went by.

### History of past illness

The patient had no previous medical history.

### Personal and family history

There was no specific family history.

### Physical examination

The patient had a body temperature of 36.1 °C, a heart rate of 54 bpm, a respiratory rate of 18 breaths per minute, a blood pressure of 101/61 mmHg, and oxygen saturation in room air of 97%. His mental status was light drowsy. Clinical neurological examination revealed left hemiparesis, left hemifacial palsy, mild dysarthria, and asomatognosia. Our first clinical consideration was an acute cerebral

infarction.

### **Laboratory examinations**

Blood analysis revealed a normal leukocyte count of  $7.7 \times 10^9/L$  with normal hematocrit and platelet count. Prothrombin time and partial thromboplastin time were normal and d-dimers were increased at  $2.38 \mu\text{g/mL}$ . Serum C-reactive protein was within normal range and erythrocyte sedimentation rate was 10 mm/h. Blood biochemistries and urine analysis results were normal. Electrocardiogram, chest X-ray, and arterial blood gas analysis were also normal. After 2 wk of hospitalization, the patient complained of dry eyes and mouth. Thus further studies were performed. Anti-Ro and anti-La antibodies known to be associated with Sjogren's syndrome, were positive and his Schirmer's test showed a possible shortage of tears.

### **Imaging examinations**

On computed tomography angiography, total obstruction of the right common carotid artery and the M1 portion of the right middle cerebral artery was noted. There was a large acute infarction in the right frontoparietal area on the MR image. Salivary scintigraphy was performed at 2 wk after hospitalization to evaluate functional status of his salivary glands. It demonstrated markedly decreased excretory function of bilateral parotid and submandibular glands, while the uptake ability was relatively preserved. On salivary scintigraphy, an unexpected accumulation of Tc-99m pertechnetate in the right frontoparietal area was also noted (Figure 1). We correlated it with brain magnetic resonance (MR) image. Fluid-attenuated inversion recovery phase MR (FLAIR phase MR) image showed diffuse high signal intensity in the same area (Figure 1). Anterior and posterior horns of the right lateral ventricle were obliterated and the midline was slightly shifted to the left side due to right frontoparietal swelling.

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## **MULTIDISCIPLINARY EXPERT CONSULTATION**

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### ***Kang HG, MD, PhD, Associate Professor, Department of Neurology, Jeonbuk National University Medical School and Hospital***

The patient should undergo immediate transcatheter endovascular thrombectomy of the right common carotid artery with thrombolytic agent as a treatment for acute cerebral infarction.

### ***Han YH, MD, PhD, Fund Professor, Department of Nuclear Medicine, Research Institute of Clinical Medicine of Jeonbuk National University-Biomedical Research Institute of Jeonbuk National University Hospital, Jeonbuk National University Medical School and Hospital***

To evaluate his dry eyes and mouth, anti-Ro and anti-La antibodies, Schirmer's test, and salivary scintigraphy using Tc-99m pertechnetate are necessary.

### ***Jeong HJ, Seok Tae Lim, MD, PhD, Professor, Department of Nuclear Medicine, Research Institute of Clinical Medicine of Jeonbuk National University-Biomedical Research Institute of Jeonbuk National University Hospital, Jeonbuk National University Medical School and Hospital***

An unexpected accumulation of Tc-99m pertechnetate in the right frontoparietal area was detected. Markedly decreased excretory function of the bilateral parotid and submandibular glands was also noticed suggesting Sjogren's syndrome.

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## **FINAL DIAGNOSIS**

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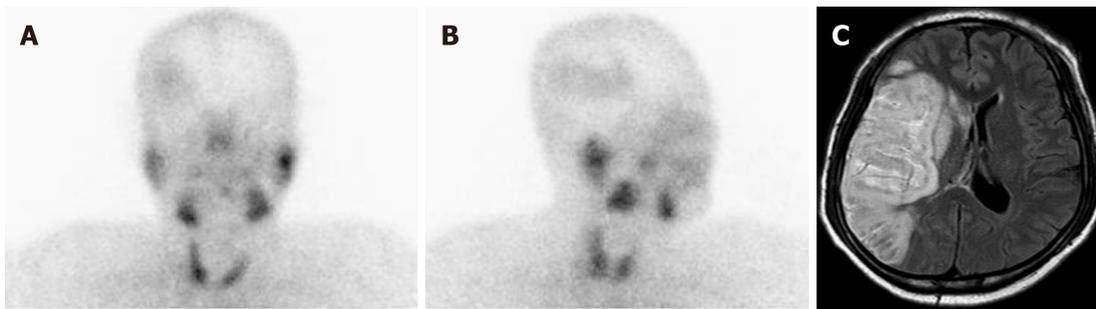
The final diagnosis of the presented case was cerebral infarction with unexpected accumulation of Tc-99m pertechnetate in the subacute phase.

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## **TREATMENT**

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Immediate transcatheter endovascular thrombectomy of the right common carotid artery was performed and a thrombolytic agent was started. The National Institutes of Health stroke scale score was improved from 12 points before thrombectomy to 6 points after thrombectomy and decreased to 3 points after 8 d. After proper management for acute infarction using aspirin, clopidogrel, and mannitol, the patient could walk without assistance of other people. He was independent for most basic activities of daily living, although he might need help with more complex tasks (modified Rankin scale, 3). His eye and mouth dryness also gradually improved after taking pilocarpine, a muscarinic cholinergic agonist. He was discharged after 15 d of hospitalization and regular check-ups were performed in the Departments



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**Figure 1 Salivary scintigraphy and fluid-attenuated inversion recovery phase magnetic resonance image at 2 wk after diagnosis of acute cerebral infarction.** A and B: Anterior and right oblique images of salivary scintigraphy show an unexpected accumulation of Tc-99m pertechnetate in the right frontoparietal area; C: Fluid-attenuated inversion recovery phase magnetic resonance image demonstrates diffuse high signal intensity in the same area. Anterior and posterior horns of the right lateral ventricle were obliterated and the midline was slightly shifted to the left side due to right frontoparietal swelling.

of Neurology and Rheumatology.

## OUTCOME AND FOLLOW-UP

Two years after the diagnosis of acute infarction, the second series of salivary scintigraphy and brain MR were performed for follow-up evaluation. On salivary scintigraphy, there was no abnormal radioactivity in the brain (Figure 2). FLAIR phase MR image also demonstrated markedly decreased high signal intensity in the previous infarction lesion without evidence of swelling (Figure 2). Informed consent for publication of clinical data was obtained from the patient.

## DISCUSSION

Tc-99m pertechnetate is a truly carrier-free radiotracer and transported by the sodium iodide symporter. Therefore, Tc-99m pertechnetate scintigraphy is a powerful imaging modality for assessing sodium iodide symporter activity in various organs[1]. It is widely used to evaluate the function of the thyroid and salivary glands and to detect ectopic gastric mucosa in Meckel's diverticulum[2].

Salivary scintigraphy using Tc-99m pertechnetate provides a series of processes in which saliva is produced and excreted. Therefore, it is used for salivary gland diseases such as radiation sialoadenitis and Sjogren's syndrome to evaluate saliva production and excretory functions of major salivary glands such as the parotid and submandibular glands.

Attempts have been made to localize brain tumors using Tc-99m pertechnetate and Tc-99m labeled phosphate compound from the 1960s to the 1980s[3-4]. However, currently there is no case of using them for such purpose. There are some reports of an unusual uptake of Tc-99m pertechnetate in pediatric Burkitt's lymphoma and in an unilateral breast used predominantly during breastfeeding[5-6]. Uptake mechanisms are thought to be an increased blood pool and a functional overexpression of sodium iodide symporter, respectively.

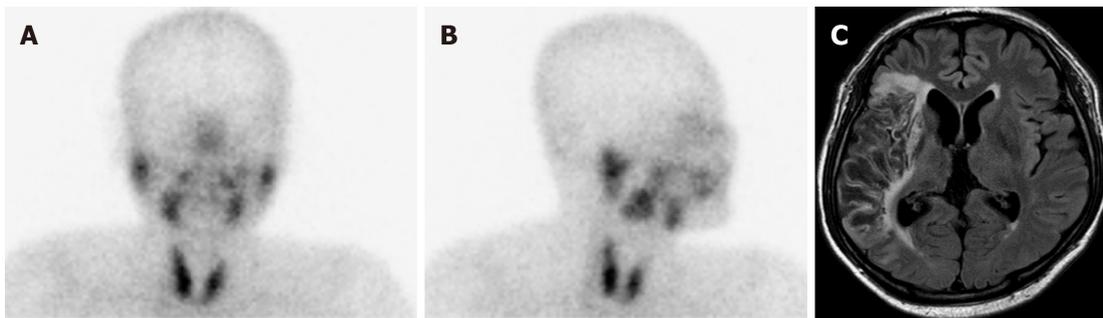
The mechanism of radiotracer localization in a brain lesion can be related to a variety of factors, including increased vascularity, abnormal vascular permeability, edema, and selective cellular metabolism. The underlying mechanism may differ among chemical compounds of the radiotracer and pathologic types of lesions. In our case, the ingrowth and proliferation of new capillaries with enhanced permeability in a subacute cerebral infarction might be the main reason for the accumulation of Tc-99m pertechnetate.

Not many nuclear physicians know that Tc-99m pertechnetate can be taken up by subacute cerebral infarctions. To the best of our knowledge, this is the first report to demonstrate Tc-99m pertechnetate uptake in a subacute cerebral infarction on salivary scintigraphy.

Recognizing these findings and determining the mechanism of their occurrence could make a great impact on early diagnosis of critical disease and appropriate management of patients.

## CONCLUSION

This case highlights that Tc-99m pertechnetate could accumulate in a subacute cerebral infarction lesion. The mechanisms of an unexpected uptake of Tc-99m pertechnetate in unusual sites should be evaluated



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**Figure 2** Follow-up salivary scintigraphy and fluid-attenuated inversion recovery phase magnetic resonance image after 2 years. A and B: The second series of salivary scintigraphy shows no abnormal radioactivity in the brain; C: Fluid-attenuated inversion recovery phase magnetic resonance image also demonstrates markedly decreased high signal intensity without evidence of swelling in the previous lesion suggesting chronic infarction.

and kept in mind for better interpretation.

## FOOTNOTES

**Author contributions:** Han YH and Lim ST were nuclear physicians, performed the conceptualization, investigation, and contributed to manuscript drafting; Jeong HJ reviewed the literature and contributed to manuscript editing; Kang HG was a neurophysician and performed the disease consultation and manuscript drafting; Han YH and Lim ST were responsible for the revision of the manuscript for important intellectual content; all authors issued final approval for the version to be submitted.

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