

Fluorodeoxyglucose-induced allergic reaction: A case report

Ion Codreanu, Constantin A Dasanu, Gregory S Weinstein and Chaitanya Divgi

J Oncol Pharm Pract published online 20 January 2012

DOI: 10.1177/1078155211436023

The online version of this article can be found at:

<http://opp.sagepub.com/content/early/2012/01/20/1078155211436023>

Published by:



<http://www.sagepublications.com>

Additional services and information for *Journal of Oncology Pharmacy Practice* can be found at:

Email Alerts: <http://opp.sagepub.com/cgi/alerts>

Subscriptions: <http://opp.sagepub.com/subscriptions>

Reprints: <http://www.sagepub.com/journalsReprints.nav>

Permissions: <http://www.sagepub.com/journalsPermissions.nav>

>> **Proof** - Jan 20, 2012

[What is This?](#)

Fluorodeoxyglucose-induced allergic reaction: A case report

Ion Codreanu

Department of Radiology, The University of Arizona Medical Center, Tucson, AZ, USA

Constantin A Dasanu

Department of Hematology-Oncology, St. Francis Hospital and Medical Center, Hartford, CT, USA

Gregory S Weinstein

Department of Otorhinolaryngology, Head and Neck Surgery, Hospital of the University of Pennsylvania, Philadelphia, PA, USA

Chaitanya Divgi

Department of Radiology, Columbia University Medical Center, New York, NY, USA

Abstract

The number of diagnostic positron emission tomography/computed tomography (PET/CT) procedures performed in the USA and worldwide is rapidly increasing. Although the benefits of these procedures are obvious, the increasing use of radiopharmaceuticals requires a better understanding of potential adverse effects and their proper management. We present herein the first report of an allergic reaction to fluorodeoxyglucose in the setting of repeated PET/CT scans for restaging purposes in a patient with pyriform sinus cancer.

Keywords

Allergy, F18-FDG, PET radiopharmaceutical

Introduction

Fluoride, the ionic form of fluorine, represents the 13th most abundant element in the crust of the earth. Fluorine's highest electronegativity makes it one of the most chemically reactive elements, giving unique properties to many of its compounds. Organic fluorine compounds are widely used in medicine. Despite the remarkable impact of fluorinated molecules in clinical medicine, they are not completely devoid of risk. Contact dermatitis and acne-like eruptions have been associated with fluorinated toothpaste.^{1,2} Occupational contact dermatitis and allergies to fluorinated anesthetics have been described in anesthesiology staff.^{3,4} Occasional reports of hypersensitivity reactions have been reported with many other fluorinated agents such as quinolones,^{5,6} antifungals,^{7–10} selective serotonin reuptake inhibitors,¹¹ and even fluorinated corticosteroids.^{12–14} We report an allergic reaction to

fluorine-18-labeled fluorodeoxyglucose (F18-FDG), the most common radiopharmaceutical used in positron emission tomography. To the best of our knowledge, there are no previous reports of allergic reactions to F18-FDG in the world literature.

Case report

We describe a 59-year-old male with history of squamous cell carcinoma of the right pyriform sinus (T1N2aM0), status post-transoral robotic surgery, supracricoid right hemipharyngolaryngectomy and neck dissection, followed by chemoradiotherapy.

Corresponding author:

Ion Codreanu, Department of Radiology, The University of Arizona Medical Center, 1501 North Campbell Ave. P.O. Box 245067, Tucson, AZ 85724, USA.
Email: codrion@yahoo.com

The patient reported having recurring body rash and itching after two of his restaging positron emission tomography/computed tomography (PET/CT) scans done 3.5 months apart. Each PET/CT scan was performed 60 min after injection of *circa* 15.0 mCi of F18-FDG. No oral contrast or other medications were administered during the scan visits. The prominence of the body rash and itching for over 24 h prompted a visit to a dermatologist who prescribed fexofenadine, with some symptom relief.

The patient had known allergies to bupropion (hives), penicillins (rash, fever), trimethoprim-sulfamethoxazole (diarrhea, dry heaves, stomach cramps) and clindamycin (rash). Notwithstanding, none of these medications were taken in that period. Past medical history was significant for hypertension, hyperlipidemia, and hypothyroidism. At baseline, he complained of chronic dry mouth, mild taste disturbance, and difficulty swallowing, which developed as a result of chemoradiation and remained stable over time. The medications he was taking included aspirin 81 mg orally daily and L-thyroxine 175 mcg orally daily.

Skin examination revealed the presence of pruritic, red papules on the face, trunk, and extremities. A few scratch marks were present in his back. Physical examination was otherwise unremarkable.

Laboratory studies performed several days after the scan showed the following: hemoglobin 14.8 g/dL, hematocrit 42%, white blood cell count $3.9 \times 10^3 \mu\text{L}^{-1}$, neutrophils 72%, lymphocytes 11%, monocytes 10%, eosinophils 6%, basophils 1%, and platelets $259 \times 10^3 \mu\text{L}^{-1}$. His baseline eosinophils during previous year varied between 0% and 3%.

The PET/CT scans showed post-surgical changes in the larynx and right neck, with no abnormal foci of increased radiotracer uptake to suggest residual or metastatic disease.

As a premedication before future PET/CT scans, the patient was prescribed prednisone 50 mg (one tablet 12 h prior to scan and one tablet 2 h prior to scan) and 25 mg diphenhydramine (one tablet 10 h prior to scan). This proved to be effective and no allergic symptoms were reported during a subsequent PET/CT scan.

Discussion

F-18 FDG PET scan is a relatively new, but expanding imaging modality. With increasing number of individuals exposed to F18-FDG, the number of allergic reactions is expected to increase. To date, there are no published reports of allergic reactions to F18-FDG and, to our knowledge, this represents the first such case.

Chemically, F18-FDG represents a glucose molecule with an attached positron emitting radioactive isotope

fluorine-18 in the 2' position. Given a variety of allergic reactions reported to fluorinated molecules, we hypothesize that allergic reactions to F18-FDG can also be expected. Adverse effects to possible chemical impurities are at least a theoretical consideration.¹⁵ The probability of an allergic reaction in our patient was estimated by an overall score of 9 on Naranjo nomogram for adverse drug reaction assessment. A score in this range defines an allergic reaction as 'definite'. However, the exact mechanism is not known and represents a matter of debate. T-cell-mediated hypersensitivity to various drugs, including fluorinated quinolones, has been described in the literature.^{6,16} Non-immune, idiopathic urticariform reactions, mediated by complement system and other plasmatic systems are also possible. Apart from the borderline elevated eosinophils compared to baseline values, no other distinct laboratory abnormalities suggestive of an allergic reaction were found in our patients.

In conclusion, along with the expanding of the FDG-PET/CT imaging, allergic reactions to F18-FDG may occur. Although rare, they must be made widely known to insure early diagnosis and potentially fatal outcomes. Although there are no established treatment recommendations for the FDG-induced allergies, it would not be unreasonable to follow standard protocols for the management of allergic reactions. We advocate secondary prophylactic measures, such as premedication with steroids and H₁-receptor blockers, for patients with known allergies to the F18-FDG before exposing them again to these agents.

Funding

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Competing interests

The authors declare that they have no competing interests.

References

1. Epstein E. Letter: fluoride toothpastes as a cause of acne-like eruptions. *Arch Dermatol* 1976; 112(7): 1033-1034.
2. Keanie H. Fluoride allergy. *Br Dent J* 2007; 202(9): 507-508.
3. Vellore AD, Drought VJ, Sherwood-Jones D, Tunnicliffe B, Moore VC, Robertson AS, et al. Occupational asthma and allergy to sevoflurane and isoflurane in anaesthetic staff. *Allergy* 2006; 61(12): 1485-1486.
4. Finch TM, Muncaster A, Prais L and Foulds IS. Occupational airborne allergic contact dermatitis from isoflurane vapour. *Contact Dermat* 2000; 42(1): 46.
5. Scherer K and Bircher AJ. Hypersensitivity reactions to fluoroquinolones. *Curr Allergy Asthma Rep* 2005; 5(1): 15-21.

6. Schmid DA, Depta JP and Pichler WJ. T cell-mediated hypersensitivity to quinolones: mechanisms and cross-reactivity. *Clin Exp Allergy* 2006; 36(1): 59–69.
7. Fabre B, Albes B, Belhadjali H and Bazex J. Acute generalized exanthematous pustulosis due to fluconazole. *Ann Dermatol Venereol* 2002; 129(3): 294–297.
8. Heikkila H, Timonen K and Stubb S. Fixed drug eruption due to fluconazole. *J Am Acad Dermatol* 2000; 42(5 Pt 2): 883–884.
9. Lester LJ, Brantley JS, Kelso RL, Kelly BC, Pettitt MS and Wilkerson MG. Severe cutaneous adverse drug reaction due to fluconazole. *J Drugs Dermatol* 2008; 7(11): 1084–1087.
10. Malik R, Medeiros C, Wigney DI and Love DN. Suspected drug eruption in seven dogs during administration of flucytosine. *Aust Vet J* 1996; 74(4): 285–288.
11. Richard MA, Fiszenson F, Jreissati M, Jean Pastor MJ and Grob JJ. Cutaneous adverse effects during selective serotonin reuptake inhibitors therapy: 2 cases. *Ann Dermatol Venereol* 2001; 128(6–7): 759–761.
12. Figueredo E, Cuesta-Herranz JI, De Las Heras M, Lluch-Bernal M, Umpierrez A and Sastre J. Anaphylaxis to dexamethasone. *Allergy* 1997; 52(8): 877.
13. Karsh J and Yang WH. An anaphylactic reaction to intra-articular triamcinolone: a case report and review of the literature. *Ann Allergy Asthma Immunol* 2003; 90(2): 254–258.
14. Sener O, Caliskaner Z, Yazicioglu K, Karaayvaz M and Ozanguc N. Nonpigmenting solitary fixed drug eruption after skin testing and intra-articular injection of triamcinolone acetonide. *Ann Allergy Asthma Immunol* 2001; 86(3): 335–336.
15. Kuge Y, Nishijima K, Nagatsu K, Seki K, Ohkura K, Tanaka A, et al. Chemical impurities in [18F]FDG preparations produced by solid-phase 18F-fluorination. *Nucl Med Biol* 2002; 29(2): 275–279.
16. Schnyder B and Pichler WJ. Mechanisms of drug-induced allergy. *Mayo Clin Proc* 2009; 84(3): 268–272.