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Transfer of IgE-mediated hypersensitivity with autologous stem cell transplantation

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Summary

In this paper, the transfer of IgE-mediated food allergy by means of autologous stem cell transplantation in a 24-years old male patient is reported.

Introduction

Modern therapeutic interventions for various hematological and neoplastic diseases have given us the opportunity to confirm the systemic nature of allergic diseases. We would like to report the transfer of allergic hypersensitivity in a patient who was submitted to autologous stem cell transplantation for Hodgkin's lymphoma.

Case report

G.M. is a 27 years old male patient who repeatedly experienced during childhood pharyngeal itching, conjunctival edema, eyelid angioedema and breathlessness 5 to 20 minutes after eating shellfish, specially shrimps and prawns. In October 2002 he developed a mediastinal mass due to nodular sclerosis classical Hodgkin's lymphoma, stage II-B. Initial treatment was 6 cycles of ABVD followed by radiotherapy for mediastinum and neck. On August 2006 the patient experienced the first relapse of lymphoma, as detected by means of CT scan and PET, and 4 cycles of Gemcitabine/Doxorubicin/Vinorelbine induced complete remission of the disease.

In April 2007 the patient received a autologous stem cell transplantation (high dose chemotherapy with hematopoyetic stem cell support). The transfer consisted of 3.4 x 10^6 CD34+ cells per kg that were administered after treatment with BCNU 350 mg/sq meter on day -7, etoposide 125 mg/sq meter and ARA-C 125 mg/sq meter every 12 hours on days -6 to -3, and melphalan 140 mg/sq meter on day -2. The patient has been free of tumor until now.

On February 2009 he consulted our allergology clinics specifically asking if his food allergy could have been modified by the treatment given for malignancy. He had no previous history of other allergic conditions, there was no family history of atopy, and is presently asymptomatic. No manifestations of respiratory, cutaneous or gastrointestinal allergies have occurred after the cell transfer, and he has followed the recommendation given to him in childhood on avoiding the intake of shellfish. Present physical examination is within normal limits.

Immediate-type skin hypersensitivity tests were done by the prick method with inhalant and food allergenic extracts from ALK-Abelló (Madrid, Spain), with reading at 15 minutes. A wheal ≥ 3 mm than glycerosaline control was considered as a positive test. The results of skin tests are shown in Table 1. There were positive responses to shellfish mix (crab, shrimp, lobster, oyster), *Blomia tropicalis*, *Dermatophagoides pteronyssinus*, *Blatella germanica*, Ragweed, and dog.

Table 1 - Results of Immediate-type skin tests with inhalant and food allergenic extracts

Allergen extracts		**Wheal diameters (mm)**
Moulds	Penicillium, Aspergillus, Cladosporium, Alternaria	0
Pollens	Ragweed	3
	Pigweed, *Plantago lanceolata*, *Cynodon dactylon*, Cupressus, *Chenopodium album*	0
Animals	Cat, Bird feathers	0
	Dog	3
Insects	Cockroach (*Blatella germanica*)	7
Foods	Milk, Eggs, Wheat, Oat, Barley, Corn, Soy, Peanut, Orange, Chicken, Banana, Beef, Cocoa, Fish mix, Tomato, Pineapple, Strawberry, Tuna, Salmon	0
	Shellfish mix	5
Mites	*Dermatophagoides pteronyssinus*	6
	Blomia tropicalis	8
Controls	Glycerosaline solution	0
	Histamine phosphate 1 mg/ml	8

Discussion

Allergic sensitization of transient duration can be passively transferred by blood transfusion from an allergic donor (1). New-onset food allergy after solid organ transplantation from a donor allergic to the culprit food has also been described (2). Various investigators have previously demonstrated the transfer of allergic reactivity to peanut (3, 4), oral and cutaneous allergy (5-7) by means of allogeneic or HLA-identical bone marrow transplantation (BMT) from allergic donors. Resolution of peanut and latex allergy with bone marrow transplantation from non allergic donors has also been observed (8, 9).

Those observations led to propose that the acquisition of allergen-specific IgE and asthma from allogeneic BMT is due to the transfer of mature B- and T- cell clones with allergen-specific memory and hematopoietic progenitor cells. Since the patient described in this paper received a cellular infusion enriched for CD34+ stem cells, we would like to suggest that progenitor cells are crucial for the establishment of allergen-specific IgE responses.

Giving support to the importance of progenitor cells for transferring allergic reactivity, we would like to mention the following facts:

- The chemotherapeutic regimen given to the patient, consisting of BCNU, etoposide, ARA-C and melphalan is known to be fully myeloablative, resulting in total medular aplasia.
- Allergen-specific T and B cells are responsible for the transfer of allergic responses through bone marrow transplantation (2). In the case of autologous stem cell transplantation only CD34+ progenitor cells are administered, and no contamination with viable allergen-specific T and B cells in sufficient numbers, able to divide and transfer sensitization during the transplant , is likely.

Present case would support the concept of allergy being a systemic disease where hemopoietic cells derived from the bone marrow migrate through the circulation to peripheral tissues such as the nasal and bronchial mucosa and the skin, as proposed by Denburg et al. (10).

Interestingly, the strongest prick test reactions observed in our patient were to extracts from shellfish, cockroaches and mites. Since cross reactions to arthropods, crustaceans and insects are due to allergic responses to tropomyosin, our results would suggest that production of IgE to this allergen is determined by bone marrow-derived precursor cells specific for this panallergen. To our knowledge, this is the first report of the transfer of allergic hypersensitivity with autologous stem cells.

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