CME EXAM

MS# & Article title: 20-00911, Occupational allergies to cannabis
Author(s): Ine I. Decuyper, M. D., Brett J. Green, Ph. D., Gordon L. Sussman, M.D., Didier G. Ebo, M. D., William S. Silvers, M. D., Karin Pacheco, M. D., Bradley S. King, Ph. D., John R. Cohn, M. D., Robert S. Zeiger, M. D., Ph.D., Joanna S. Zeiger, M.S., Ph.D., David R. Naimi, M. D., Donald H. Beezhold, Ph. D., Ajay P. Nayak, M. Sc., Ph.D.
Issue: Nov/Dec 2020 (Occupational Allergic Diseases theme)
Review series: Clinical Commentary
Editor: Michael Schatz, MD, MS
Editor disclosure: M. Schatz declares he has no relevant conflicts of interest.

Learning objectives:
1. To appreciate the nuances of cannabis industry operations in the 21st century and identify the potential biological and chemical hazards in the occupational environment.
2. To understand the spectrum of symptoms associated with cannabis allergy.
3. To formulate a strategy for diagnosis and management of symptomatic cannabis workers.

Questions:

1. Which of the following occupational respiratory diseases is caused by inhalation of hemp dust?
   a. symbiosis
   b. dysbiosis
   c. byssinosis
   d. hypnosis

Answer: C
Explanation: Byssinosis is marked by airway obstruction and inflammation from inhalation of organic hemp dust; however, the disease is not mediated by IgE antibodies to specific allergens.

2. Which of the following secondary allergens are commonly associated with the cannabis plant?
   a. fungal
   b. pesticides
   c. endotoxin
   d. volatile organic compounds (VOCs)

Answer: A
Explanation: Fungi commonly contaminate cannabis plants and can serve as a source of secondary allergens.

3. Among European symptomatic cannabis users, there is high prevalence of IgE cross-reactivity to which of the following plant foods?
   a. there is no IgE cross-reactivity

b. coconut
c. peaches
d. pineapple

Answer: C
Explanation: There is a high prevalence of IgE cross reactivity amongst European symptomatic cannabis users to peaches. This is explained by the presence of non-specific lipid transfer proteins in cannabis and these plant food species that share sequence similarities.

4. Which of the following proteins have been identified as a major allergen of cannabis by IUIS?
a. oxygen evolving enhancing protein 2 (OEEP2)
b. thaumatin-like protein (TLP)
c. non-specific lipid transfer protein (nsLTP)
d. RuBisCO

Answer: C
Explanation: While thaumatin-like protein and RuBisCO have been reported as potential allergens of cannabis, only non-specific lipid transfer protein has been identified as a major allergen by IUIS and is identified as Can s 3. OEEP2 (Can s 4) is a minor allergen of cannabis.

5. Which of the following research laboratory-based diagnostic approaches has the superior *sensitivity* in cannabis allergy diagnosis?
a. cytometric bead array (CBA) – recombinant Can s 3
b. ImmunoCAP – hemp
c. basophil activation test (BAT) – recombinant Can s 3
d. basophil activation test (BAT) – crude cannabis extract

Answer: B
Explanation: The ImmunoCAP (hemp) is the most sensitive assay to-date (87%) but is available for research use only. The BAT and CBA have sensitivity of 71% and 63% respectively when used with recombinant Can s 3. The BAT with crude cannabis extract has a sensitivity of 63%.

6. Which of the following laboratory-based diagnostic approaches has the superior *specificity* in cannabis allergy diagnosis?
a. basophil activation test (BAT) – crude cannabis extract
b. ImmunoCAP - hemp
c. immunoproteomics
d. cytometric bead array (CBA) – recombinant Can s 3

Answer: D
Explanation: ImmunoCAP (hemp) has poor specificity of 32%, while immunoproteomics approach is only helpful in allergen identification. BAT with crude cannabis extract has a specificity of 67%, but CBA with recombinant Can s 3 has a superior specificity of 87%.