

Exploring the Potential and Limitations of Chat Generative Pre-trained Transformer (ChatGPT) in Generating Board-Style Dermatology Questions: A Qualitative Analysis

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Abstract

This article investigates the limitations of Chat Generative Pre-trained Transformer (ChatGPT), a language model developed by OpenAI, as a study tool in dermatology. The study utilized ChatPDF, an application that integrates PDF files with ChatGPT, to generate American Board of Dermatology Applied Exam (ABD-AE)-style questions from continuing medical education articles from the *Journal of the American Board of Dermatology*. A qualitative analysis of the questions was conducted by two board-certified dermatologists, assessing accuracy, complexity, and clarity. Out of 40 questions generated, only 16 (40%) were deemed accurate and appropriate for ABD-AE study preparation. The remaining questions exhibited limitations, including low complexity, lack of clarity, and inaccuracies. The findings highlight the challenges faced by ChatGPT in understanding the domain-specific knowledge required in dermatology. Moreover, the model's inability to comprehend the context and generate high-quality distractor options, as well as the absence of image generation capabilities, further hinders its usefulness. The study emphasizes that while ChatGPT may aid in generating simple questions, it cannot replace the expertise of dermatologists and medical educators in developing high-quality, board-style questions that effectively evaluate candidates' knowledge and reasoning abilities.

Categories: Dermatology, Medical Education

Keywords: multiple-choice questions, artificial intelligence in medicine, medical education, chatgpt, dermatology

Introduction

Chat Generative Pre-trained Transformer (ChatGPT) is a language model developed by OpenAI (San Francisco, CA, USA) that has shown promise in various natural language processing (NLP) tasks, including medical education and multiple-choice question generation [1,2]. Within dermatology, ChatGPT has been shown to create case reports indistinguishable from those written by humans and assist in creating patient handouts [3,4]. Beyond these applications, the model holds promise in streamlining routine administrative duties, facilitating patient education, enhancing medical instruction, and promoting improved healthcare literacy among patients [5]. Furthermore, ChatGPT has been employed for taking licensing examinations and responding to specialty board review questions, demonstrating an average accuracy rate close to passing thresholds [6,7]. While promising, the use of ChatGPT in this context poses certain limitations and challenges. These include the potential to generate erroneous data or incorrect answers, as well as the risk of introducing biased content [5]. In this study, we explore the limitations of ChatGPT as a study tool in dermatology through a qualitative analysis of the ChatGPT-generated American Board of Dermatology Applied Exam (ABD-AE)-style questions.

Materials And Methods

ChatPDF is an application that combines the ability to upload entire PDF files into a ChatGPT 3.5 portal. The continuing medical education (CME) articles from the *Journal of the American Academy of Dermatology* (JAAD) are considered high-yield review material for the ABD-AE. CME articles from the JAAD (volume 88, issues 1-4) were imported into ChatPDF [8-15]. It was then asked to create five ABD-AE-style multiple-choice questions. The resulting sets of questions from each article were subjected to an independent and rigorous analysis by two board-certified dermatologists, ensuring a comprehensive evaluation of the questions' quality (Figures 1-11). The evaluation encompassed three essential dimensions: accuracy, complexity, and clarity. Dermatologists individually assessed each question's appropriateness for the required depth of knowledge for the ABD-AE, and the clarity of its wording and structure. The evaluation process involved in-depth discussions between the dermatologists to resolve any scoring discrepancies and to foster a consensus-driven evaluation.

How to cite this article

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ChatPDF-generated multiple choice questions in the style of the American Board of Dermatology Applied Exam based off of eight continuing medical education articles from the Journal of the American Academy of Dermatology

Yellow highlight indicates low complexity questions or answer choices

Pink highlight indicates vague or unclear questions or answer choices

Red highlight indicates inaccurate questions or answer choices

Blue highlight indicates authors comments (not generated by ChatPDF)

Drozdowski R, Spaccarelli N, Peters MS, Grant-Kels JM. Dysplastic nevus part I: Historical perspective, classification, and epidemiology. *J Am Acad Dermatol.* 2023 Jan;88(1):1-10. doi: 10.1016/j.jaad.2022.04.068. Epub 2022 Aug 28. PMID: 36038073.

1. A 45-year-old patient presents with a new pigmented lesion on their leg. On dermoscopy, the lesion exhibits irregular pigmentation and asymmetric borders. The patient has a history of multiple basal cell carcinomas. What is the most appropriate next step in management?

Accurate

- A. Excisional biopsy
- B. Observation with total body photography
- C. Topical treatment with imiquimod
- D. Referral for reflectance confocal microscopy

Answer: A. Excisional biopsy

2. Which of the following is a characteristic feature of melanoma? Low complexity

- A. Uniform color
- B. Smooth borders
- C. Symmetry
- D. Irregular pigmentation

Answer: D. Irregular pigmentation

3. A 60-year-old patient presents with a history of multiple actinic keratoses on their face and scalp. What is the recommended treatment for this patient? Vague/unclear. Does patient have current actinic keratoses or only a history of actinic keratoses?

- A. Observation without intervention
- B. Cryotherapy or topical therapy with 5-fluorouracil or imiquimod
- C. Excisional biopsy of all lesions
- D. Antibiotic therapy

Answer: B. Cryotherapy or topical therapy with 5-fluorouracil or imiquimod

FIGURE 1: ChatPDF-generated multiple-choice questions in the style of the American Board of Dermatology Applied Exam based on eight continuing medical education articles from the Journal of the American Academy of Dermatology with author commentary (Questions 1-3).

4. Which technique correctly diagnosed lesions 82% of the time in differentiating biopsy-proven DN from thin melanomas? **Unclear**

- A. Qualitative pattern analysis
- B. ABCD rule of dermoscopy
- C. The 7-point checklist
- D. All of the above

Answer: A. Qualitative pattern analysis

5. What is considered to be an effective tool for evaluating dysplastic nevi? **Inaccurate, all answers may be effective tools for evaluating dysplastic nevi.**

- A. Total body photography
- B. Reflectance confocal microscopy
- C. Histopathologic features
- D. Dermoscopic features

Answer: D. Dermoscopic features

Spaccarelli N, Drozdowski R, Peters MS, Grant-Kels JM. Dysplastic nevus part II: Dysplastic nevi: Molecular/genetic profiles and management. *J Am Acad Dermatol.* 2023 Jan;88(1):13-20. doi: 10.1016/j.jaad.2022.05.071. Epub 2022 Oct 14. PMID: 36252690.

6. A 52-year-old man presents with a 10-year history of a pruritic rash that has not cleared with triamcinolone cream. On physical examination, he has erythematous scaling patches on his chest and buttocks. A biopsy reveals psoriasiform dermatitis with parakeratosis and neutrophilic microabscesses in the stratum corneum. Which of the following is the most appropriate therapy to institute at this time? **Inaccurate**

- a. Cyclosporine
- b. Doxycycline
- c. Gamma interferon
- d. Narrowband UVB
- e. Tacrolimus ointment
- f. Terbinafine

Answer: e (Spaccarelli et al., page 1)

7. A 35-year-old woman presents with a new mole on her back that has irregular borders and variegated coloration. The mole measures 8 mm in diameter and has been present for several months. Which of the following is a best practice for evaluating this patient? **Low complexity**

- a. Biopsy all moles larger than 6 mm in diameter.
- b. Use dermoscopy to evaluate all moles.
- c. Consider patient risk factors and family history when deciding which moles to biopsy.
- d. Refer all patients with atypical moles to a dermatopathologist for evaluation.

Answer: c (Learning objectives)

8. Which statement about melanoma arising from dysplastic nevi is true? **Accurate**

- a. It is always associated with positive histologic margins.

FIGURE 2: ChatPDF-generated multiple-choice questions in the style of the American Board of Dermatology Applied Exam based on eight continuing medical education articles from the Journal of the American Academy of Dermatology with author commentary (Questions 4-8).

- b. It is more likely to occur in individuals without a family history of melanoma.
- c. It often harbors BRAF V600E mutations.
- d. It typically presents as an amelanotic lesion.

Answer: c (Kim et al., page 8)

9. Which of the following is a limitation of using dermoscopy to evaluate atypical nevi? **Low complexity**

- a. It is not useful for evaluating pigmented lesions on non-skin surfaces.
- b. It cannot distinguish between benign and malignant lesions with high accuracy.
- c. It requires specialized training and expertise to perform and interpret.
- d. It is not covered by most insurance plans.

Answer: c (Learning objectives)

10. Which of the following is a recommended treatment option for a patient with multiple histologically dysplastic nevi? **Low complexity**

- a. Observation with close follow-up
- b. continue topical imiquimod therapy
- c. Cryotherapy of all dysplastic nevi
- d. Excision of all dysplastic nevi with 2 mm margins

Answer: a (Learning objectives)

Wang RF, Ko D, Friedman BJ, Lim HW, Mohammad TF. Disorders of hyperpigmentation. Part I. Pathogenesis and clinical features of common pigmentary disorders. *J Am Acad Dermatol.* 2023 Feb;88(2):271-288. doi: 10.1016/j.jaad.2022.01.051. Epub 2022 Feb 11.

11. A 30-year-old woman presents with hyperpigmentation on her cheeks and nose that has been present for several years. Biopsy reveals pigment deposition in the epidermis. Which of the following is the most likely diagnosis? **Inaccurate description of dermatopathologic findings of melasma**

- A. Melasma
- B. Postinflammatory hyperpigmentation
- C. Riehl melanosis
- D. Ochronosis

Answer: A

12. A 45-year-old man presents with diffuse hyperpigmentation on his face, neck, and upper trunk that has been present for several years and is associated with itching and burning sensations in affected areas of skin and mucosa membranes such as mouth, nose, genitalia, anus etc. Biopsy reveals pigment deposition in both epidermis and dermis along with lymphocytic infiltration around blood vessels in dermis. Which of the following is the most likely diagnosis? **Not an accurate clinic description of lichen planus pigmentosus, particular regarding involvement of mouth, nose, genitalia and anus.**

A. Lichen planus pigmentosus

FIGURE 3: ChatPDF-generated multiple-choice questions in the style of the American Board of Dermatology Applied Exam based on eight continuing medical education articles from the Journal of the American Academy of Dermatology with author commentary (Questions 9-12).

- B. Ashy dermatosis
 - C. Pigmented contact dermatitis
 - D. Postinflammatory Hyperpigmentation
- Answer: A

13. A 50-year-old man presents with diffuse hyperpigmentation on his face, neck, and upper trunk that has been present for several years. Biopsy reveals pigment deposition in the dermis. Which of the following is the most likely diagnosis? Unclear/uncomplete histopathologic and clinical descriptions.

- A. Melasma
 - B. Postinflammatory hyperpigmentation
 - C. Riehl melanosis
 - D. Ochronosis
- Answer: D

14. A 25-year-old woman presents with hyperpigmented macules on her face and neck that developed after a recent acne breakout. Which of the following is the most likely diagnosis? Low complexity

- A. Melasma
 - B. Postinflammatory hyperpigmentation
 - C. Riehl melanosis
 - D. Ochronosis
- Answer: B

15. A 40-year-old woman presents with hyperpigmentation on her face and neck that has been present for several months. She reports that the hyperpigmentation appeared after she started using a new skin care product. Which of the following is the most likely diagnosis? Unclear how to differentiate Riehl melanosis from pigmented contact dermatitis.

- A. Melasma
 - B. Postinflammatory hyperpigmentation
 - C. Riehl melanosis
 - D. Pigmented contact dermatitis
- Answer: D

Ko D, Wang RF, Ozog D, Lim HW, Mohammad TF. Disorders of hyperpigmentation. Part II. Review of management and treatment options for hyperpigmentation. *J Am Acad Dermatol.* 2023 Feb;88(2):291-320. doi: 10.1016/j.jaad.2021.12.065. Epub 2022 Feb 12. Erratum in: *J Am Acad Dermatol.* 2023 Apr 11; PMID: 35158001.

16. A 35-year-old woman presents with melasma on her cheeks and forehead. Which of the following is a key challenge in managing this condition? Low complexity

- A. Rapid recurrence after treatment
- B. Hypopigmentation risk with many treatment modalities
- C. Resistance to treatment

FIGURE 4: ChatPDF-generated multiple-choice questions in the style of the American Board of Dermatology Applied Exam based on eight continuing medical education articles from the Journal of the American Academy of Dermatology with author commentary (Questions 13-16).

D. All of the above

Answer: C. Resistance to treatment is a key challenge in managing pigmentary disorders such as melasma and postinflammatory hyperpigmentation.

17. Which of the following is NOT a medical or procedural treatment option for dyschromias?

Accurate

- A. Photoprotection
- B. Topical lightening agents
- C. Oral agents
- D. Cryotherapy

Answer: D. Cryotherapy is not a medical or procedural treatment option for dyschromias.

18. A 45-year-old man with postinflammatory hyperpigmentation presents for management options. Which of the following is an example of a topical lightening agent used in the management of hyperpigmentation? Low complexity

- A. Hydroquinone
- B. Isotretinoin
- C. Methotrexate
- D. Cyclosporine

Answer: A. Hydroquinone is an example of a topical lightening agent used in the management of hyperpigmentation.

19. According to the article, what is one potential risk associated with some chemical peels used for treating hyperpigmentation? Vague/unclear

- A. Hypopigmentation
- B. Hyperpigmentation exacerbation
- C. Scarring
- D. Infection

Answer: B. Hyperpigmentation exacerbation is one potential risk associated with some chemical peels used for treating hyperpigmentation.

20. A 28-year-old woman presents with dyschromias on her face and neck and wants to know about laser therapy options. What type of laser therapy has less risk of post-inflammatory hyperpigmentation (PIH)? Accurate

- A. Q-switched nanosecond laser (QSL)
- B. Nonablative fractionated laser
- C. Intense pulsed light (IPL)
- D. Picosure Laser

FIGURE 5: ChatPDF-generated multiple-choice questions in the style of the American Board of Dermatology Applied Exam based on eight continuing medical education articles from the Journal of the American Academy of Dermatology with author commentary (Questions 17-20).

Answer: B. Nonablative fractionated laser has less risk of post-inflammatory hyperpigmentation (PIH) compared to Q-switched nanosecond laser (QSL) and intense pulsed light (IPL).

Kreher MA, Noland MMB, Konda S, Longo MI, Valdes-Rodriguez R. Risk of melanoma and nonmelanoma skin cancer with immunosuppressants, part I: Calcineurin inhibitors, thiopurines, IMDH inhibitors, mTOR inhibitors, and corticosteroids. *J Am Acad Dermatol*. 2023 Mar;88(3):521-530. doi: 10.1016/j.jaad.2022.11.044. Epub 2022 Nov 30. PMID: 36460257.

21. A 55-year-old male with a history of liver transplant presents with a new erythematous papule on his forehead. The lesion has been present for several months and has not resolved with topical corticosteroids. What is the most likely diagnosis? *Vague/unclear. Not enough information in the questions stem to determine an accurate answer.*

- (A) Basal cell carcinoma
- (B) Squamous cell carcinoma
- (C) Melanoma
- (D) Merkel cell carcinoma

Answer: (A)

22. A 40-year-old female presents with a new onset of pruritic, scaly plaques on her scalp and forehead. She has a history of rheumatoid arthritis and has been on methotrexate therapy for the past year. What is the most appropriate next step in management? *Accurate*

- (A) Increase the dose of methotrexate
- (B) Switch to cyclosporine therapy
- (C) Discontinue methotrexate and initiate topical corticosteroids
- (D) Perform a skin biopsy

Answer: (D)

23. A 65-year-old male presents with multiple actinic keratoses on his face and scalp. He has a history of heart transplant and is currently receiving immunosuppressive therapy. Which type of immunosuppressive agent is most likely responsible for his increased risk of actinic keratoses? *Inaccurate.*

- (A) Corticosteroids
- (B) Thiopurines
- (C) mTOR inhibitors
- (D) IMDH inhibitors

Answer: (A)

24. A 50-year-old female presents with a new pigmented lesion on her back that has been increasing in size over the past several months. She has no significant medical history but

FIGURE 6: ChatPDF-generated multiple-choice questions in the style of the American Board of Dermatology Applied Exam based on eight continuing medical education articles from the Journal of the American Academy of Dermatology with author commentary (Questions 21-24).

reports frequent sun exposure during outdoor activities. What is the most appropriate next step in management? [Low complexity](#)

- (A) Perform a skin biopsy
- (B) Order blood tests to monitor liver function
- (C) Initiate topical corticosteroids
- (D) Discontinue sun exposure

Answer: (A)

25. A 70-year-old male presents with a new onset of erythematous, scaly plaques on his face and scalp. He has a history of lung transplant and is currently receiving immunosuppressive therapy. What is the most appropriate next step in management? [Low complexity](#)

- (A) Increase the dose of immunosuppressive therapy
- (B) Switch to cyclosporine therapy
- (C) Discontinue immunosuppressive therapy and initiate topical corticosteroids
- (D) Perform a skin biopsy

Answer: (D)

Kreher MA, Konda S, Noland MMB, Longo MI, Valdes-Rodriguez R. Risk of melanoma and nonmelanoma skin cancer with immunosuppressants, part II: Methotrexate, alkylating agents, biologics, and small molecule inhibitors. J Am Acad Dermatol. 2023 Mar;88(3):534-542. doi: 10.1016/j.jaad.2022.11.043. Epub 2022 Nov 30. PMID: 36460256.

26. A 45-year-old male presents with a history of rheumatoid arthritis and has been taking methotrexate for the past year. He is concerned about his risk of developing skin cancer. Which of the following statements regarding methotrexate and skin cancer risk is true? [Accurate](#)

- A. Methotrexate has not been linked to an increased risk of nonmelanoma or melanoma skin cancer
- B. Methotrexate has only been linked to an increased risk of nonmelanoma skin cancer, not melanoma
- C. Methotrexate has been linked to an increased risk of both nonmelanoma and melanoma skin cancer
- D. Methotrexate has only been linked to an increased risk of melanoma, not nonmelanoma skin cancer

Answer: C

27. A 60-year-old female presents with a history of kidney transplant and has been taking immunosuppressants for the past 10 years. She is concerned about her risk of developing skin cancer and asks if there are any preventative measures she can take to reduce her risk. Which of the following recommendations would be appropriate? [Low complexity](#)

- A. Avoiding sun exposure during peak hours (10am-4pm) and wearing protective clothing when outdoors

FIGURE 7: ChatPDF-generated multiple-choice questions in the style of the American Board of Dermatology Applied Exam based on eight continuing medical education articles from the Journal of the American Academy of Dermatology with author commentary (Questions 25-27).

- B. Applying sunscreen with a minimum SPF 15 daily, even on cloudy days
- C. Performing regular self-examinations for new or changing moles or lesions
- D. All of the above

Answer: D

28. A 55-year-old male presents with a history of psoriasis and has been taking biologic medications for the past year. He is concerned about his risk of developing skin cancer and asks if there are any specific screening practices he should follow. Which statement regarding screening practices for patients taking biologics is true? Vague/unclear. Use of the term biologic is vague. Risk of skin cancers likely differs greatly depending on which biologic.

- A. Patients taking biologics are not at an increased risk for skin cancer compared to the general population, and therefore do not require any specific screening practices
- B. Patients taking biologics should undergo regular skin cancer screenings, including full-body skin exams and dermoscopy, due to an increased risk of both nonmelanoma and melanoma skin cancer
- C. Patients taking biologics should only be screened for melanoma, not nonmelanoma skin cancers
- D. Patients taking biologics should only undergo skin cancer screenings if they have a personal or family history of skin cancer

Answer: B

29. A 70-year-old female presents with a history of breast cancer and has been taking alkylating agents for the past year. She is concerned about her risk of developing skin cancer and asks if there are any specific types of skin cancer she should be aware of. Which of the following statements regarding alkylating agents and skin cancer risk is true? Accurate

- A. Alkylating agents have only been linked to an increased risk of melanoma, not nonmelanoma skin cancer
- B. Alkylating agents have only been linked to an increased risk of nonmelanoma skin cancer, not melanoma
- C. Alkylating agents have been linked to an increased risk of both nonmelanoma and melanoma skin cancer
- D. Alkylating agents have not been linked to an increased risk of skin cancer

Answer: C

30. A 50-year-old male presents with a history of heart transplant and has been taking immunosuppressants for the past 5 years. He is concerned about his risk of developing skin cancer and asks how screening practices for solid organ transplant recipients differ from those for other patients taking immunosuppressants. Which statement regarding screening practices for solid organ transplant recipients is true? Accurate

- A. Solid organ transplant recipients are not routinely screened for skin cancer
- B. Screening practices for solid organ transplant recipients do not differ from those for other patients taking immunosuppressants

FIGURE 8: ChatPDF-generated multiple-choice questions in the style of the American Board of Dermatology Applied Exam based on eight continuing medical education articles from the Journal of the American Academy of Dermatology with author commentary (Questions 28-30).

C. Screening practices for solid organ transplant recipients reflect the increased risk of both nonmelanoma and melanoma skin cancers associated with posttransplant immunosuppression
D. Solid organ transplant recipients are only screened for nonmelanoma skin cancers, not melanoma
Answer: C

Motamedi M, Ferrara G, Yacyshyn E, Osman M, Abril A, Rahman S, Netchiporouk E, Gniadecki R. Skin disorders and interstitial lung disease: Part I-Screening, diagnosis, and therapeutic principles. J Am Acad Dermatol. 2023 Apr;88(4):751-764. doi: 10.1016/j.jaad.2022.10.001. Epub 2022 Oct 11. PMID: 36228941.

31. A 45-year-old male with a history of psoriasis presents with shortness of breath and dry cough. Which of the following screening tests should be considered? **Vague/unclear.**

- A) Pulmonary function tests and high-resolution chest computed tomography
- B) Skin biopsy and blood tests
- C) Electrocardiogram and echocardiogram
- D) Urinalysis and liver function tests

Answer: A

32. A 60-year-old female with a history of scleroderma presents with worsening dyspnea on exertion. Which of the following is a common pulmonary complication associated with scleroderma? **Accurate**

- A) Pulmonary embolism
- B) Pneumonia
- C) Interstitial lung disease
- D) Chronic obstructive pulmonary disease

Answer: C

33. A 50-year-old male smoker presents with a persistent cough and weight loss. Which of the following is an essential step in improving respiratory outcomes in patients at risk for interstitial lung disease? **Accurate**

- A) Early identification and elimination of pulmonary risk factors, including smoking
- B) Administration of systemic corticosteroids
- C) Initiation of immunosuppressive therapy
- D) Referral to a pulmonologist for lung transplant evaluation

Answer: A

34. A 55-year-old female with a history of dermatomyositis presents with progressive muscle weakness and dysphagia. Which of the following is a potential complication associated with dermatomyositis that may require screening for interstitial lung disease? **Accurate**

- A) Cardiac arrhythmias
- B) Renal failure
- C) Gastrointestinal bleeding
- D) Aspiration pneumonia

FIGURE 9: ChatPDF-generated multiple-choice questions in the style of the American Board of Dermatology Applied Exam based on eight continuing medical education articles from the Journal of the American Academy of Dermatology with author commentary (Questions 31-34).

Answer: D

35. A 40-year-old male patient presents to the dermatology clinic with skin lesions consistent with sarcoidosis. Which of the following is a common pulmonary manifestation associated with sarcoidosis? [Accurate](#)

- A) Pulmonary fibrosis
- B) Pulmonary hypertension
- C) Acute respiratory distress syndrome
- D) Bronchial asthma

Answer: A

Ouchene L, Muntyanu A, Assayag D, Veilleux È, Abril A, Ferrara G, Yacyshyn E, Pineau CA, O'Brien E, Baron M, Osman M, Gniadecki R, Netchiporouk E. Skin disorders and interstitial lung disease: Part II-The spectrum of cutaneous diseases with lung disease association. *J Am Acad Dermatol.* 2023 Apr;88(4):767-782. doi: 10.1016/j.jaad.2022.09.051. Epub 2022 Oct 10. PMID: 36228940.

36. A 45-year-old male presents with a history of psoriasis and shortness of breath. Which of the following is true regarding the association between psoriasis and interstitial lung disease? [Accurate](#)

- A. Psoriasis is not associated with interstitial lung disease.
- B. Interstitial lung disease is a rare complication of psoriasis.
- C. Psoriasis is a known risk factor for interstitial lung disease.
- D. Interstitial lung disease only occurs in patients with severe psoriasis.

Answer: C

37. A 60-year-old female presents with a rash on her face and chest, as well as shortness of breath and coughing. Which of the following skin diseases is most commonly associated with pulmonary involvement? [Accurate](#)

- A. Atopic dermatitis
- B. Rosacea
- C. Lupus erythematosus
- D. Pemphigus vulgaris

Answer: C

38. A 50-year-old male with a history of sarcoidosis presents to the dermatology clinic for evaluation of skin lesions on his arms and legs, as well as coughing and chest pain. Which of the following imaging studies is most appropriate for evaluating pulmonary involvement in sarcoidosis? [Accurate](#)

- A. Chest X-ray
- B. Computed tomography (CT) scan
- C. Magnetic resonance imaging (MRI)

FIGURE 10: ChatPDF-generated multiple-choice questions in the style of the American Board of Dermatology Applied Exam based on eight continuing medical education articles from the Journal of the American Academy of Dermatology with author commentary (Questions 35-38).

D. Positron emission tomography (PET) scan
Answer: B

39. A 55-year-old female presents to the emergency department with acute onset shortness of breath, chest pain, and fever after starting treatment for her newly diagnosed dermatomyositis with high-dose corticosteroids and methotrexate therapy two weeks ago. Which of the following pulmonary complications should be suspected in this patient? *Vague/unclear.*

- A. Pulmonary embolism
 - B. Acute respiratory distress syndrome (ARDS)
 - C. Pneumonia
 - D. Pulmonary fibrosis
- Answer: B

40. A 40-year-old male with a history of systemic sclerosis presents to the dermatology clinic for evaluation of skin tightening and shortness of breath. Which of the following pulmonary complications is most commonly associated with systemic sclerosis? *Accurate*

- A. Pulmonary embolism
 - B. Pulmonary hypertension
 - C. Acute respiratory distress syndrome (ARDS)
 - D. Pneumonia
- Answer: B

FIGURE 11: ChatPDF-generated multiple-choice questions in the style of the American Board of Dermatology Applied Exam based on eight continuing medical education articles from the Journal of the American Academy of Dermatology with author commentary (Questions 39-40).

Results

A total of 40 questions were created using ChatPDF for the eight CME articles. After an independent review of the questions, it was found that out of 40 questions, 10 (25%) were of low complexity, 9 (22.5%) were vague or unclear, and 5 (12.5%) were inaccurate (Figure 12). Of the 40 questions, only 16 (40%) questions created using ChatGPT 3.5 were accurate and at an appropriate level of complexity for a trainee studying for ABD-AE (Table 1).

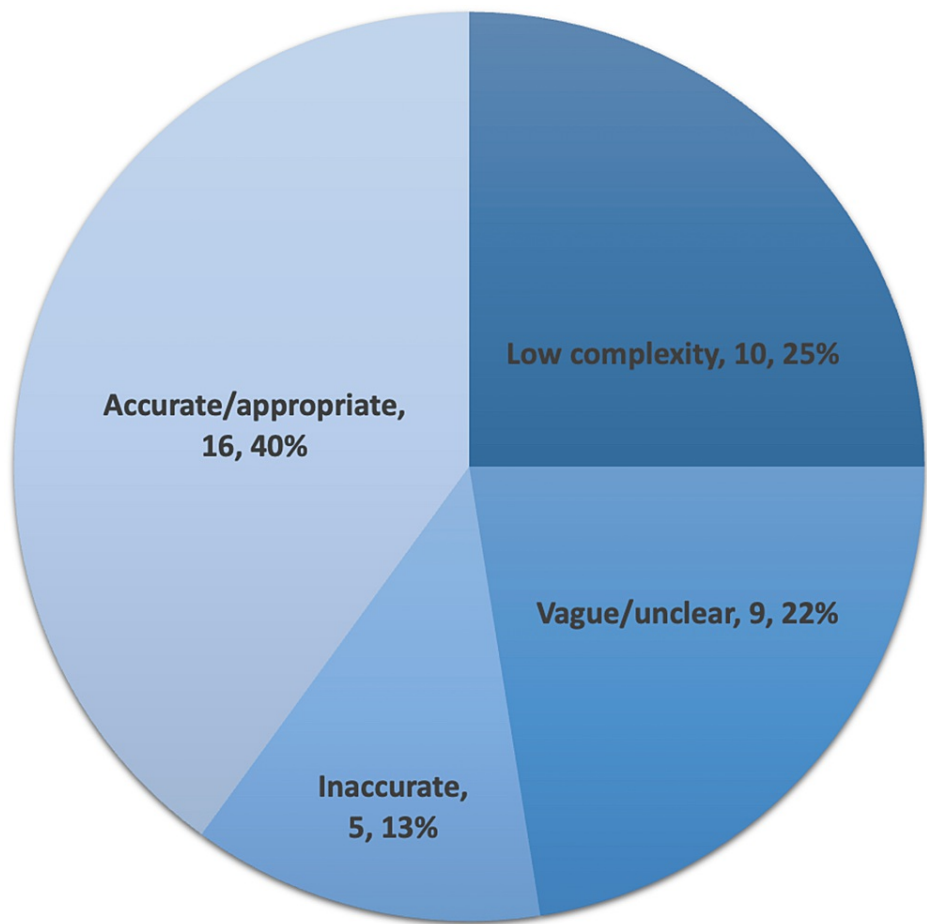


FIGURE 12: Pie chart depicting the categorization of ChatPDF-generated multiple-choice questions in the style of the American Board of Dermatology Applied Exam based on eight continuing medical education articles from the Journal of the American Academy of Dermatology.

Article title	Low complexity	Vague/unclear	Inaccurate	Accurate/appropriate
Dysplastic nevus part I: historical perspective, classification, and epidemiology	1	2	1	1
Dysplastic nevus part II: dysplastic nevi: molecular/genetic profiles and management	3	0	1	1
Disorders of hyperpigmentation. Part I. Pathogenesis and clinical features of common pigmentary disorders	1	2	2	0
Disorders of hyperpigmentation. Part II. Review of management and treatment options for hyperpigmentation	2	1	0	2
Risk of melanoma and nonmelanoma skin cancer with immunosuppressants, part I: calcineurin inhibitors, thiopurines, IMDH inhibitors, mTOR inhibitors, and corticosteroids	2	1	1	1
Risk of melanoma and nonmelanoma skin cancer with immunosuppressants, part II: methotrexate, alkylating agents, biologics, and small molecule inhibitors	1	1	0	3
Skin disorders and interstitial lung disease: part I - screening, diagnosis, and therapeutic principles	0	1	0	4
Skin disorders and interstitial lung disease: part II -the spectrum of cutaneous diseases with lung disease association	0	1	0	4
Total, n (%)	10 (25)	9 (22.5)	5 (12.5)	16 (40)

TABLE 1: Categorization of ChatPDF-generated multiple-choice questions in the style of the American Board of Dermatology Applied Exam based on eight continuing medical education articles from the Journal of the American Academy of Dermatology.

Discussion

ChatGPT has limitations as an educational tool for ABD-AE study preparation, with <50% of the generated questions found to be accurate and appropriate. The questions exhibited low complexity, as exemplified by inquiries like, "Which of the following is a characteristic feature of melanoma? A. Uniform color B. Smooth borders C. Symmetry D. Irregular pigmentation; Answer: D." Moreover, there were issues with clarity, such as the question, "A 45-year-old male with a history of psoriasis presents with shortness of breath and dry cough. Which of the following screening tests should be considered? A) Pulmonary function tests and high-resolution chest computed tomography B) Skin biopsy and blood tests C) Electrocardiogram and echocardiogram D) Urinalysis and liver function tests; Answer: A." Furthermore, 12.5% of generated questions were incorrect or inaccurate, raising concerns about the reliability of artificial intelligence-generated questions. This study identified the limited domain-specific knowledge of ChatGPT as a major limitation as dermatology requires a deep understanding of skin anatomy, physiology, and pathology, which ChatGPT lacks. ChatGPT's inability to understand the context and generate high-quality distractor options, as well as its incapacity to generate images, further limits its usefulness. To address these limitations, future research should focus on developing domain-specific language models that possess deep knowledge of dermatology. By improving the model's understanding of skin-related concepts and its ability to generate contextually appropriate questions and distractors, it may become a more reliable and valuable tool for medical education and exam preparation in dermatology.

Conclusions

Our study demonstrates that while ChatGPT shows promise as an educational tool in dermatology, its limitations must be acknowledged. Generating ABD-AE-style questions with sufficient accuracy, complexity, and clarity remains a challenge for ChatGPT. The model's inability to understand context and lack of domain-specific knowledge contribute to the generation of suboptimal questions. Future research efforts addressing these shortcomings might increase its utility in question generation for the ABD-AE. In conclusion, while ChatGPT may help generate simple questions, it cannot replace the expertise of dermatologists and medical educators in developing high-quality, board-style questions that accurately test a candidate's knowledge and reasoning abilities.

Additional Information

Disclosures

Human subjects: All authors have confirmed that this study did not involve human participants or tissue.

Animal subjects: All authors have confirmed that this study did not involve animal subjects or tissue.

Conflicts of interest: In compliance with the ICMJE uniform disclosure form, all authors declare the following: **Payment/services info:** All authors have declared that no financial support was received from any organization for the submitted work. **Financial relationships:** All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work. **Other relationships:** All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

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