

ChatGPT Goes to the Radiation Oncology Oral Board Exam

Andrew B Barbour^{1*} and T Aleksandr Barbour²

¹Department of Radiation Oncology, University of Washington – Fred Hutchinson Cancer Center, Seattle, WA, USA

²Starlink, SpaceX, Redmond, USA

***Corresponding author:** Andrew B Barbour, Department of Radiation Oncology, University of Washington – Fred Hutchinson Cancer Center, Seattle, WA, USA

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Commentary

Artificial intelligence (AI) includes a broad range of computational models, such as natural language processing (NLP) [1], and has a variety of current and future applications in the healthcare setting [2,3]. In November 2022, the AI language model ChatGPT was publicly released (chat.openai.com) and quickly demonstrated proficiency on a diverse set of tasks, including United States Medical Licensing Examination questions [4]. ChatGPT was pre-trained on a large volume of text data and designed to process and analyze human language, thus ChatGPT is classified as an NLP and large language model. It is named 'GPT' due to the design of 'Generative Pre-trained Transformer' deep learning architecture, wherein a model is pre-trained on data, a transformer model neural network is used to process data, and human-like language is generated. When simulating human language, ChatGPT may provide convincingly false information and its trustworthiness for use in radiation oncology has been questioned [5].

Most healthcare professionals have a poor understanding of AI and providers are less likely to use AI in healthcare delivery if they do not trust or understand the technology [6-8]. To improve the understanding of AI by healthcare providers in radiation oncology, we interacted with ChatGPT version 3.5, asking a series of questions regarding the work-up and management of a patient with unfavorable intermediate-risk prostate cancer. Below, we present a truncated version of that interaction, which has been edited for brevity. The full, unedited transcript is available as [Appendix A](#). We leave the reader to reach their own conclusions.

- **Author:** "You are a medical doctor. A 68-year-old man comes to your office with a PSA level of 11. What diagnostic tests would you like to order?"
- **ChatGPT:** "As a medical doctor, if a 68-year-old man comes to my office with a PSA level of 11 ng/mL, I would order further diagnostic tests to evaluate his prostate health and determine if he has prostate cancer. The following tests would be useful in making a diagnosis: DRE..., TRUS..., prostate biopsy..., MRI..., CT scan or bone scan... It is important to note that an elevated PSA level does not necessarily mean that a person has prostate cancer, as there are many other factors that can affect PSA levels. Therefore, the combination of several diagnostic tests is necessary to confirm a diagnosis."
- **Author:** "You perform a DRE and the patient's prostate is smooth without irregularity. A TRUS and prostate biopsy are performed. Of the 12 biopsy cores, 7 have prostate adenocarcinoma with a Gleason grade group of 3. MRI of the pelvis is obtained and is normal. Do you want any more information or diagnostic tests before providing a treatment recommendation?"
- **ChatGPT:** "The following tests or information could be considered: PSA velocity..., imaging of the prostate and surrounding tissues..., patient comorbidities... Based on this information, a multidisciplinary team consisting of a urologist, radiation oncologist, and medical oncologist can determine the best treatment plan for the patient."

- **Author:** "... What are the patient's prostate cancer prognostic stage and risk group?"
- **ChatGPT:** "... The patient's cancer is clinically classified as stage T1c (based on elevated PSA levels and biopsy findings), and there is no evidence of regional lymph node or distant metastasis on imaging studies. Therefore, the patient's prostate cancer is categorized as stage II according to the AJCC staging system... The NCCN risk group classification system is based on several factors, including PSA level, biopsy findings, and clinical stage. Based on the information provided, the patient's NCCN risk group is intermediate risk..."
- **Author:** "Is the patient's risk group favorable intermediate or unfavorable intermediate?"
- **ChatGPT:** "... The patient has a PSA level of 11 ng/mL and biopsy findings of 7 out of 12 cores with Gleason grade group 3 (which is equivalent to Gleason score 7), which places him in the intermediate-risk group. To determine if the patient's risk group is favorable or unfavorable intermediate, we need to consider additional factors, such as: age..., PSA velocity..., percent of biopsy cores involved..., clinical stage... Without additional information, it is difficult to definitively classify the patient's risk group as favorable or unfavorable intermediate. However, based on the information provided, the patient's risk group is likely closer to favorable intermediate, as his PSA level is relatively low, and the cancer appears to be confined to the prostate gland..."
- **Author:** "...What treatment options would you provide to this patient?"
- **ChatGPT:** "... Active Surveillance: For some patients with low-risk or favorable intermediate-risk prostate cancer, active surveillance may be a reasonable option. This involves monitoring the cancer with regular PSA tests, digital rectal exams, and repeat biopsies, and delaying treatment until the cancer shows signs of progression.

Surgery: Radical prostatectomy, which involves removing the entire prostate gland, may be recommended for patients with intermediate-risk prostate cancer. This treatment is typically recommended for patients with a life expectancy of greater than 10 years and who have a life expectancy that is longer than the time required for recovery from surgery.

Radiation Therapy: External beam radiation therapy (EBRT) or brachytherapy (implantation of radioactive seeds into the prostate gland) may be recommended for patients with intermediate-risk prostate cancer...

Combination Therapy: For some intermediate-risk prostate cancer patients, a combination of surgery and radiation therapy may be recommended to increase the chance of curing the cancer.

Androgen Deprivation Therapy (ADT): ADT is a form of hormone therapy that reduces the levels of male hormones (androgens), which can cause prostate cancer cells to grow. ADT may be used in combination with radiation therapy for intermediate-risk prostate cancer patients."

- **Author:** "You are a radiation oncologist and see this patient in your office. The patient has unfavorable intermediate-risk prostate cancer and has completed his staging work-up, showing no evidence of prostate cancer outside of the prostate. The patient would like combination therapy with EBRT and ADT. What radiation dose and fractionation would you recommend?"
- **ChatGPT:** "For patients with unfavorable intermediate risk prostate cancer who receive EBRT and ADT, a radiation dose of 78 Gy in 39 fractions over approximately 8 weeks is the standard of care based on results from multiple randomized clinical trials. The use of ADT in combination with radiation therapy has been shown to improve disease-free survival and overall survival in patients with intermediate and high-risk prostate cancer.
The radiation dose and fractionation can be adjusted depending on several factors, including the patient's age, overall health status, and treatment-related toxicities. In some cases, a higher radiation dose of up to 80 Gy in 40 fractions may be considered in patients with higher-risk disease, although this can increase the risk of side effects such as urinary and bowel toxicity. It is important to discuss the potential benefits and risks of radiation therapy and ADT with the patient, including potential side effects such as fatigue, erectile dysfunction, and hot flashes. Additionally, the patient's overall health status, personal preferences, and the availability of radiation therapy and ADT resources should be considered when developing an individualized treatment plan."
- **Author:** "How many months of androgen deprivation therapy would you recommend?"
- **ChatGPT:** "... The standard duration of ADT in combination with radiation therapy is currently 18-36 months based on the results of several clinical trials, although some studies have suggested that longer durations of ADT may provide additional benefits. For patients with unfavorable intermediate risk prostate cancer, a duration of 24-36 months of ADT is often recommended in combination with radiation therapy. However, the optimal duration of ADT should be individualized based on the patient's risk profile, age, overall health status, and personal preferences..."
- **Author:** "When treating this unfavorable intermediate-risk prostate adenocarcinoma patient with EBRT, how would you design your treatment volume?"
- **ChatGPT:** "... a combination of pelvic and prostate-only radiation fields is typically used"

- **Author:** "You decide to treat this patient's prostate to 78 Gy in 39 fractions and decide to also use a pelvic radiation field to treat the pelvic lymph nodes. What dose and fractionation do you prescribe to the pelvic radiation field?"
- **ChatGPT:** "... the standard dose and fractionation is 45 Gy in 25 fractions..."
- **Author:** "What radiation treatment technique would you use when treating this patient with EBRT?"
- **ChatGPT:** "... In this case, either IMRT or VMAT..."
- **Author:** "When designing EBRT to the prostate and pelvic lymph nodes for this unfavorable intermediate-risk prostate adenocarcinoma patient, what are the most important organs at risk to consider? What dosimetric constraints would you place on these organs at risk?"
- **ChatGPT:** "... The most important organs at risk include the rectum, bladder, and femoral heads.

For the rectum, the dosimetric constraints typically include limiting the maximum dose to less than 75 Gy and limiting the volume of rectum receiving more than 70 Gy (V70) to less than 15%. For the bladder, the constraints may include limiting the maximum dose to less than 80 Gy and limiting the volume of bladder receiving more than 65 Gy (V65) to less than 30%. For the femoral heads, the constraints may include limiting the mean dose to less than 45 Gy and limiting the volume of the femoral heads receiving more than 50 Gy (V50) to less than 50%."

Conflict of Interest

None.

Declaration of generative AI and AI-assisted technologies in the writing process: AI was not used in the writing or editing process, other than text specifically attributed to ChatGPT version 3.5 from OpenAI.

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Andrew B Barbour. Biomed J Sci & Tech Res



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