

October 10, 2019

Dear Program Directors, Students, and Trainees,

Prior to development of the MedPhys Match (MPM), residency program directors voluntarily agreed to make the resident recruitment process as fair as possible, to both applicants and programs,¹ by setting a uniform offer date, which was the earliest date on which offers could be made by programs to candidates. However, given that the agreement was non-binding, it was not uncommon for some programs to extend early offers to highly ranked candidates. Once word of these offers circulated, other programs followed suit. In response to this issue, the AAPM was asked by program directors to develop a match system.¹ Following a significant investment of volunteer time and effort, and a significant financial investment from the AAPM and SDAMPP, the first MPM was carried out in 2015.²

Over the last few months, some concerns have been raised regarding the viability of the MPM, including that several large residency programs had elected not to participate in the 2020 MPM. In this letter, we would like to reaffirm our support for the MPM and to help alleviate the concerns of program directors and students regarding the sustainability of the MPM.

Since its inauguration in 2015, participation in the MPM has remained steady. In 2019, 70% of all CAMPEP accredited residency programs participated in the MPM (Table 1). Additionally, based on recently released data from National Matching Services Inc. (NMS), the company that runs the MPM, 91 residencies are participating in the 2020 MPM, which again represents about 70% of CAMPEP accredited programs. Since the first year, participation has remained very stable at about 70%. The number of residency programs participating has, however, increased. Thus, there are no objective data to indicate a decline in the sustainability of the MPM program.

Table 1. Summary of the MedPhys Match (MPM) statistics for residency program participation from the inception of the MPM in 2015. (Data from National Matching Services Inc. (NMS)³ and CAMPEP annual residency reports.⁴)

Match participation	2015	2016	2017	2018	2019	2020
Participating Residencies	77	74	81	87	90	91
Participating Programs*	86	77	86	92	101	96
Positions Offered	112	111	114	129	138	131
CAMPEP Accredited Residencies	94	107	123	125	128	130
% of Accredited Residencies Participating in the MPM	82%	69%	66%	70%	70%	70%

*Note: A residency may offer more than one “program,” such as 2-year and 3-year programs, identified by a unique code through the NMS match.

At the July 2019 meeting of AAPM's Education Council at the Annual Meeting of the AAPM, concerns were shared from the Student and Trainee Subcommittee of the AAPM regarding the decision of several large residency programs to not participate in the MPM. Subsequent to a discussion on the topic, a motion was passed to have the Subcommittee on the Oversight of MedPhys Match (SCOMM) seek information from program directors that have pulled out of the match to better understand why they decided not to participate. In August of this year, SCOMM reached out to these programs and the following responses were collected.

- *Our program must recruit Canadian citizens and permanent residents over US residents.*
- *Our program is part of the military, and we can only recruit through military channels.*
- *We have a hybrid program and are looking for academically-oriented individuals.*
- *The MPM does not filter out applicants that may not be interested in our program.*
- *We believe there is a problem with the matching algorithm, we have not matched with our top choices.*
- *We have experienced issues with the match, we have not been paired with our top choices.*
- *PhD students finish throughout the year, so we need to be able to start the residency whenever they finish.*
- *We prefer to make an offer as soon as we find an acceptable applicant, the process is easier for the applicants and us.*
- *We currently recruit from our graduate student pool.*
- *The pressure to match, on both residents and programs, results in both attempting to play games to "win" the match.*
- *We receive too many applicants and prefer recruiting outside of the MPM.*
- *There is a fee associated with the MPM.*

On September 11, 2019, SDAMPP shared their position statement on the MPM with the medical physics community.⁵ The statement provided a possible explanation regarding the current concern for the MPM's viability, a summary of how the MPM works, as well as a case for staying in the match.

On October 1, 2019, AAPM's Education Council met with leadership from CAMPEP, SDAMPP, AAPM's *Medical Physics Residency Training and Promotion subcommittee*, and the *AAPM Student and Trainee subcommittee* via teleconference to discuss the concerns expressed about the viability of the MPM. During this meeting, the responses of the non-participating program directors were reviewed and discussed. Based on this and several follow-up discussions, the following summarizes Education Council's responses to the comments received:

- **Specific or limited eligibility requirements concerns:** Tools are now readily available within MPM to customize one's posting (e.g., citizenship, military status, academic/research preferences, as well as multiple postings). Additionally, we encourage programs to explicitly state their eligibility requirements or preferences to ensure the appropriate candidates apply to their programs.
- **Algorithm robustness concerns:** A description of the matching algorithm used by NMS is available on their website⁶ and detailed within a number of references.⁷⁻¹³ As stated in SDAMPP's position statement,⁵ the algorithm has proven to be robust and has been thoroughly tested. NMS, an external vendor, was intentionally selected to avoid introducing a bias in the match selection. The same algorithm used to compute the results for the MPM is also used to compute the results for the National Resident Matching Program (NRMP) for physicians. Furthermore, the 2019 NRMP Match was celebrated as the largest in history, offering greater than 35,000 positions.¹⁴ However, one should be mindful that the algorithm is designed to place an applicant into the program that is *most preferred on the applicant's list*, rather than prioritizing the residency program's rank order. The algorithm will proceed through the applicant's rank order list until a match is achieved or the applicant's list is exhausted.⁶ As such, depending on an applicant's rank order, residency programs may not always match with their top choices.
- **Variable graduation dates for PhD candidates:** Although PhD students do graduate throughout the year, rather than strictly during the June timeframe as do medical students, graduate students are aware that the vast majority of medical physics residency programs begin in or around July. In response, many students make the adjustments necessary to complete their dissertation and defense ahead of the July timeframe.¹⁵ Others have negotiated temporary post-doctoral positions with their research mentor to bridge the gap until their residency commences. Further, some residency programs offer flexibility in start dates.
- **Desire to recruit outside of the MPM and quickly make offers:** Some programs have indicated that they prefer to recruit outside of the MPM and to make offers as soon as an acceptable applicant is identified. Although the match is not mandated, recruiting outside of the match has several consequences. First, although this process may be convenient for the program, this is not always in the best interest of the candidate. A candidate may accept an offer not necessarily because they believe it is the best fit, but rather because they have been offered a position.¹⁵ In the long run, such a decision may not work well for either the program or the candidate. Second, candidates may apply to these programs as well as programs participating in the match. If given and accepting an early offer, these candidates then withdraw from the match, which may result in ill will toward the student from programs who had dedicated the time and resources to review the candidate's application material and/or interview him or her. Further, given the potentially late timing in the process that such "out of match" offers can occur, a student's withdrawal from the MPM may leave some programs in the match little time to seek alternative candidates.

- **Gaming the match:** The optimal strategy for matching is for both programs and candidates to submit their rank lists based only on their preferences.^{7,16} Some programs and candidates have attempted to game the match system by adjusting their rank order based on the likelihood a program or candidate will rank them highly.¹⁶ This is often based on post-interview communications, in which a program may contact a candidate to inform the candidate that the program intends to rank the candidate highly, or vice versa. As a consequence, the other party may adjust its initial rank order, elevating the rank of the program or candidate in their rank list. However, this information may not be truthful. For instance, candidates may feign interest in a program or conversely, programs may overstate their interest in a candidate, in the hopes that this will improve their rank.¹⁶ By overstating one's preference, the other party may alter its ranking, and the actually-preferred program or candidate may receive a lower ranking. Thus, when true preferences are not used to determine rankings, the resulting matching outcomes will be suboptimal. For the match to function as intended, parties should submit their rank order based on their true preferences.¹⁶
- **Too many applications are received through the MPM:** Receiving more applicants is primarily a function of using the Medical Physics Residency Application Program (MP-RAP) for applications. Although most programs that participate in the MPM also use MP-RAP, this is not a requirement. MP-RAP is intended to provide a common application platform for programs; however, programs may choose to use their employer's application system or another preferred process. The matching process is independent of the application process. As such, if programs feel overwhelmed with the number of applicants they receive, they can choose to post their position outside of the MP-RAP while still participating in the MPM.
- **Fees associated with the MPM:** Both programs and applicants are required to pay a fee to participate in the MPM. NMS charges approximately \$50,000 per match. The fees are used to cover the cost to run the match and to maintain the MPM infrastructure.

In keeping with AAPM Policy PP 28-A,¹⁷ the AAPM Education Council believes “that a matching program is the best way to optimize the placement of qualified applicants into accredited residency programs” and endorses the MPM “for medical physics residencies and encourages accredited programs and qualified applicants to participate.” Based on the NMS published statistics, the MPM has been shown to be viable and successful, with an average of 71% of CAMPEP accredited programs participating in the MPM since its inception in 2015.

However, the Education Council and AAPM leadership acknowledge that refinements and enhancements to the current implementation of the MPM are needed, and are committed to working with program directors, the AAPM Student and Trainee subcommittee, CAMPEP, and SDAMPP to better understand and address the concerns of each stakeholder group. Discussions have already begun to define tangible steps that we can take to together accomplish this goal.

It is our hope that the provided data will reassure medical physics graduate and residency training programs that the MPM continues to enjoy broad participation from accredited residency programs. In response to concerns that have been expressed by some programs and students, the Education Council of the AAPM has begun working with program directors, students, CAMPEP, SDAMPP, and other relevant committees within the AAPM to better understand the reasons for non-participation, to take efforts to respond to concerns raised by program directors and candidates, and to improve the overall MPM process. We welcome your comments and feedback on this matter.

Sincerely,



Cynthia H. McCollough, PhD, FAAPM, FACR, FAIMBE
President, AAPM



Joann I. Prisciandaro, PhD, FAAPM
Chair, AAPM Education Council

References

1. Antolak JA, J.P. Gibbons, and G. Starkschall. The Medical Physics Residency Common Application Process (CAP). *AAPM Newsletter*. 2014;39(3):23-25.
2. Antolak JA, J.P. Gibbons, and J.D. Bourland. MedPhys Match 2015: A Resounding Success. *AAPM Newsletter*. 2015;40(3):20-25.
3. National Matching Services Inc. MedPhys Match Statistics. <https://natmatch.com/medphys/statistics.html>. Accessed September 20, 2019.
4. CAMPEP 2018 Annual residency report. 2019; https://www.sdampp.org/documents/2019-09-11-SDAMPP-Position-Statement-Match_FINAL.pdf. Accessed September 10, 2019.
5. SDAMPP Position Statement. 2019; https://www.sdampp.org/documents/2019-09-11-SDAMPP-Position-Statement-Match_FINAL.pdf.
6. National Matching Services Inc. Matching Algorithm. <https://natmatch.com/medphys/algorithm.html>. Accessed October 1, 2019.
7. Gale D, Shapley LS. College Admissions and the Stability of Marriage. *The American Mathematical Monthly*. 1962/01/01 1962;69(1):9-15.
8. Roth AE, Peranson E. The Redesign of the Matching Market for American Physicians: Some Engineering Aspects of Economic Design. *American Economic Review*. 1999;89(4):748-780.
9. Roth AE. The Origins, History, and Design of the Resident Match. *JAMA*. 2003;289(7):909-912.
10. Roth AE. The Economics of Matching: Stability and Incentives. *Mathematics of Operations Research*. 1982;7(4):617-628.
11. Roth AE, Peranson E. The Effects of the Change in the NRMP Matching Algorithm. *JAMA*. 1997;278(9):729-732.
12. Peranson E, Randlett RR. The NRMP Matching Algorithm Revisited. *Academic Medicine*. 1995;70(6):477-484.
13. Scotti MJ. The New Match. *Journal of the American Medical Association*. 1997;278(9):764.
14. National Resident Matching Program. Press Release: Thousands of resident applicants celebrate NRMP match results. 2019; <http://www.nrmp.org/one-nine-press-release-thousands-resident-physician-applicants-celebrate-nrmp-match-results/>. Accessed October 1, 2019.
15. Mills MD, Antolak JA. Matchmaker, matchmaker, find me a match. *Journal of applied clinical medical physics*. 2015;16(1):5425-5425.
16. Nagarkar PA, Janis JE. Fixing the "match": how to play the game. *J Grad Med Educ*. 2012;4(2):142-147.
17. AAPM Policy. PP 28- A, Medical Physics Matching Program. 2014; <https://www.aapm.org/org/policies/details.asp?id=346&type=PP>. Accessed October 2, 2019.