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The influence of patient gender on medical students' care: Evaluation during an objective structured clinical examination

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ABSTRACT

Objectives: To assess whether men and women are evaluated and treated differently by medical students.
Methods: We evaluated patient care provided by 110 fifth-year medical students during an objective structured clinical examination (OSCE), using two clinical cases with standardized patients (SPs): generalized anxiety disorder (GAD) and ascending aortic dissection (AAD). Half of the students encountered male and half female SPs. Except for gender, the cases were identical. We compared diagnosis and treatment of male vs female SPs.
Results: Students diagnosed GAD more often in female SPs than in male SPs (diagnosis completed, partially completed, and not completed in 47%, 16% and 36% respectively vs. 22%, 20%, and 58% for male SPs, $p = 0.02$). The nature of symptoms was better described for male SPs. For AAD, the emergency was more frequently identified and the examination of femoral pulses better performed in female SPs.
Conclusion: Medical students have a gender bias when evaluating patients with GAD and AAD.
Practice implication: The observed gender bias in the evaluation of patients, likely leads to differences in treatment between male and female patients (i.e. under-recognition of anxiety in men). Medical schools should implement gender-sensitive medical education initiatives to improve inclusive patient care.

1. Introduction

Patients need to receive equitable care, regardless of their race, ethnicity, social class, or gender. Concerns about gender and health have increased in the scientific community. Nevertheless, evolving in gendered societies, healthcare systems are gender biased, which means that men and women might not be treated equally [1,2].

Gender inequalities in health have been studied in multiple areas, from ischemic heart disease [3,4] to doctor-patient communication [5], to adverse effects of medications [6] and the diagnosis of psychological disorders [7]. These inequalities are best addressed simultaneously at different levels: gender sensitive national policies are needed, as well as gender sensitive protocols and medical training [2].

But first, biases must be identified. Among additional biases influencing medical decision making, two types have been conceptualized [8] and identified as contributing to disparities in health between women and men: not accounting for variations between men and women when present (e.g., ignoring differences in the presentation of ischemic heart disease between men and women [4]) and gender stereotypes, that is, treating or considering men and women differently when it is not justified (e.g., neglecting to identify depression as a possible diagnosis in men [9]). Gender biases are increasingly recognized in medical research [10–12], medical practice and education [13]. Identifying gender bias in clinical practice is important to address the

Abbreviations: AAD, ascending aorta dissection; CT, computed tomography; GAD, generalized anxiety disorder; OSCE, objective structured clinical examination; SP, standardized patients.

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challenge of moving from gender biased attitudes towards gender awareness among young doctors [14].

In this study, two clinical situations were chosen to investigate the presence of gender bias: generalized anxiety disorder (GAD) and ascending aortic dissection (AAD). Theses clinical situations with reversed women/men differences in their epidemiology were chosen to highlight potential gender bias in diagnosis and treatment. Indeed, women are more than twice as likely as men to be diagnosed with an anxiety disorder [15], and the gap is even greater since the COVID-19 pandemic [16]. This leads to known bias in over-diagnosis in women (such as a diagnosis of anxiety when presenting with chest pain [17]), and potential under-diagnosis of actual anxiety disorder in men (not yet been established) [7]. On the other hand, ascending aortic dissection is twice as frequent in men than in women [18,19]. Bias in diagnosis is known in the cardiovascular field and leads to under-recognition and delay in cardiovascular diagnosis and treatment of women (extensively studied in the field of ischemic heart disease [20,21]). Gender bias in diagnosis and treatment of AAD is likely to be present, but has been little studied.

Research on clinical skills, whose biases we are interested in, is often limited due to unrealistic measurement possibilities in real-life settings. Simulated encounters between health practitioners and standardized patients offer a controlled setting to evaluate clinical skills [22]. The standardized situation offers a unique opportunity to measure clinical skills. At the Lausanne University Medical School, clinical and communication competencies are regularly assessed using objective structured clinical examinations (OSCEs). OSCEs are a clinical encounter between students and standardized patients who are playing a clinical vignette. OSCEs provide a high fidelity and authentic setting with evaluation of interpersonal skills and clinical management [23]. These standardized exams using trained patients playing clinical vignettes, is a useful way to hold several variables constant while conducting an experiment to measure potential bias, while reproducing in a reliable way inter-human skills.

This study therefore uses OSCEs to test for student bias when evaluating patient, to substantiate evidence of the need to bring gender sensitivity to heath care practice.

2. Methods

2.1. Aim

The study aim was to evaluate whether male and female patients are evaluated and treated differently when presenting with symptoms of GAD and AAD, through an audit experiment with medical students during OSCEs.

2.2. Study design and setting

At Lausanne University Medical School, students undergo a summative assessment of clinical competencies using an OSCE at the end of their fifth of six years of medical schools, just before entering 10 months of internship. During the OSCE, history taking, physical examination, and diagnostic and therapeutic management are assessed using station-specific checklists. Communication competencies are assessed at every station using the same global rating scale derived from the Analytic Global OSCE Rating developed by Hodges and McIlroy [24]), which consists of four items that explore the ability of students to respond to patient's needs, the quality of the structure of the interview, and verbal and nonverbal expression. During the spring of 2017, fifth-year medical students underwent an OSCE that included five stations, each lasting 13 min. During this OSCE, students were exposed to two different gender-sensitive OSCE stations. In these stations, half of the students encountered a female standardized patient (SP), and the other half a male SP. Apart from gender, all other patient characteristics, including their age, race/ethnicity, habits, medical history, social situation, and family history, were similar between the four male and four female SPs.

Students, SPs, and examiners were all blinded to the purpose of the study.

With regards to their exposure to gender in teaching, medical students at the University of Lausanne received a 2-hour compulsory introduction course and an optional course on gender and medicine in their first year. They also received a one-hour compulsory course in their fourth year introducing gender bias in pain management.

2.3. Study population

Half of the fifth-year medical students (n = 110) at Lausanne University Medical School, who were taking their OSCE on day 1 of the OSCE session in March 2017, took part in the study. Eight examiners evaluated the students for the first vignette, including two women and six men, and four examiners for the second vignette, all men. According to the standardized setting of the OSCE, all examiners directly observed the student-SP encounter and filled out the evaluation form during the encounter.

2.4. Case vignettes and standardized patients

Students were given the vignettes (Appendixes 1 & 2) to read before entering the examination room, describing the GAD or the AAD situation. SPs were instructed and trained to answer according to indications given in the vignettes and were provided with details concerning symptoms, habits, personal and family history, social situation. SPs were professional actors.

Training of SPs was standardized and performed by the same SP trainer; the quality of role-playing was also verified during the examination by the SP trainer.

2.5. Statistical analysis

Single checklist item scores of the students who evaluated female versus male SPs were compared by using chi-squared tests for each item.

Scores were created as described (Appendix 3). The scores between students encountering female SPs and those encountering male SPs were summed and the total results compared using the Wilcoxon-Mann-Whitney test.

In addition, results were analyzed using linear regression, with scores as the dependent variable and student gender, SP gender, and the interaction between these two variables as independent variables to assess whether there was an interaction between SP and student gender. The interaction for examiners' sex was not analyzed, given that there were few examiners (four per vignette) and only male examiners evaluated the second vignette.

The STATA 14 statistical package was used for statistical analysis. A P value of < 0.05 was considered statistically significant.

3. Results

A total of 110 students participated in the OSCE on day 1 and were included in the analyses; 60 (55%) were women and 50 (45%) were men

Table 1
Study population.

	Total	Women	Men
Clinical case 1: Anxiety			
Students, n (%)	110	60	40
Standardized patients	8	4	4
Examiners	8	2	6
Clinical case 2: Ascending aorta dissection			
Students	110	60	40
Standardized patients	8	4	4
Examiners	4	0	4

(Table 1). They were all exposed to the two clinical scenarios played by eight different SPs, four women and four men.

3.1. Vignette 1: generalized anxiety disorder

The main finding was that students were more likely to arrive at the correct diagnosis when encountering female SPs than when encountering male SPs. The diagnosis was completed, partially completed, and not completed in 47%, 16%, and 36% of the cases, respectively, when the SP was a woman versus 22%, 20%, and 58%, respectively, when the SP was a man ($p = 0.02$) (Fig. 1). Diagnostic workup and the decision for referral or a follow-up appointment were not statistically different between female and male SPs (Fig. 1). Neither was the total score for medical history (Fig. 2). However, regarding specific items of the medical history, students better characterized the nature of symptoms when encountering male SPs (completed, partially completed, and not completed in 51%, 4%, and 0% of men, respectively, vs. 38%, 17%, and 0% of women, respectively, $p = 0.002$), whereas they more often asked female SPs about associated physical symptoms (completed and not completed in 84% and 16% of women, respectively, vs. 65% and 35% of men, $p = 0.03$) (Additional file 1). Assessment of communication did not differ between the evaluation of men and women (Additional file 2).

The interaction between student and SP gender regarding diagnosis, nature of the symptoms, and associated physical symptoms was not significant (data not shown).

3.2. Vignette 2: ascending aorta dissection

We found that the urgent nature of the situation was better identified by students in contact with female SPs than it was by those in contact with male SPs, with 95% of students identifying the emergency of the situation in women versus 76% in men ($p = 0.005$) (Fig. 3). The frequency with which students made the correct diagnosis, proposed a CT scan, and provided analgesia were not different (Fig. 3). The total score for medical history was not statistically different when we compared students in contact with male and with female SPs (Fig. 4), but pain characteristics and family medical history were better explored in female SPs (pain characteristics completed, partially completed, and not completed in 75%, 25%, and 0% of women, respectively, vs. 22%, 29%, and 3%, respectively, of men, $p = 0.001$; family medical history completed in 71% of women vs. 52% of men, $p = 0.04$) (Additional file 3). The total score for physical examination was also significantly better in female SPs (Fig. 4), and especially femoral pulses were more often taken in female SPs (88% completed in female SPs vs. 54% in male SPs, $p < 0.0001$) (Additional file 4). Assessment of communication did not differ (Additional file 5).

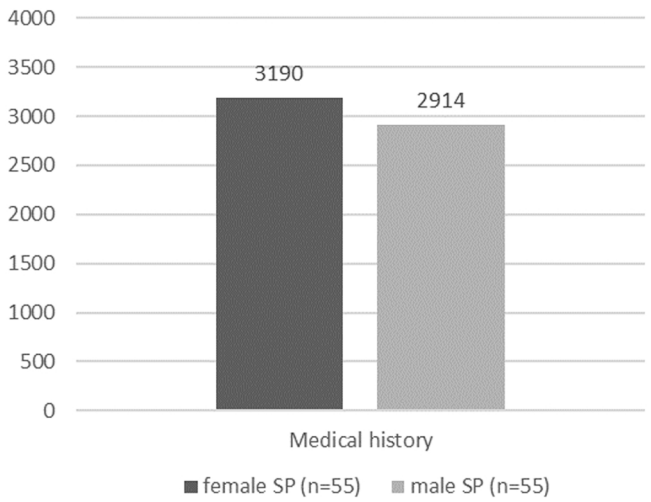

Fig. 2. Vignette 1: Total score for medical history by standardized patient (SP) gender.

The interaction between student and SP gender as a function of the understanding of the emergency of the situation, total status score, femoral pulses, pain characterization, family medical history, and communication score was not significant (data not shown).

4. Discussion and conclusion

4.1. Discussion

This study shows the presence of gender bias among senior medical students encountering female and male SPs during the OSCE. Such

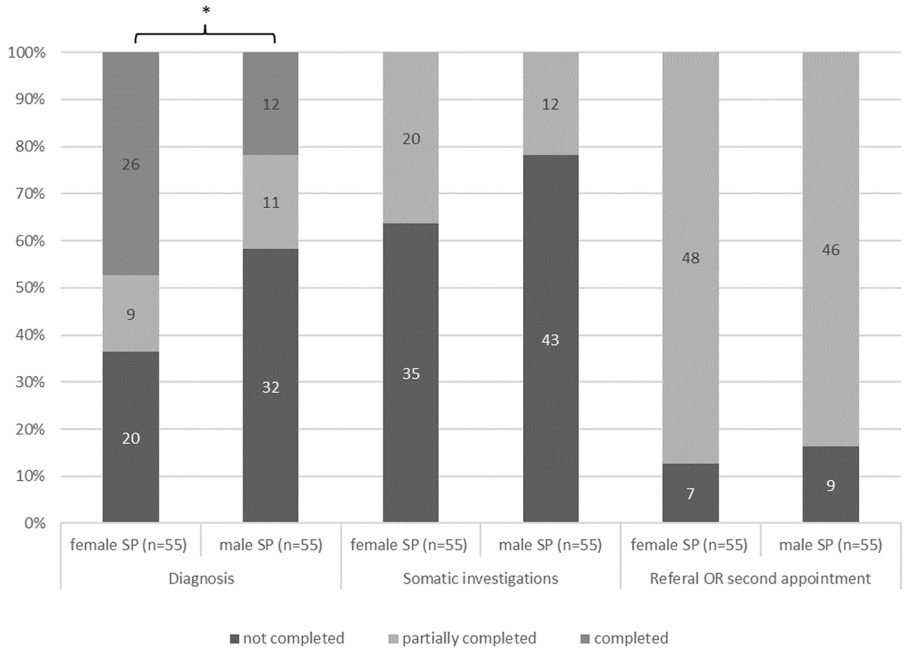

Fig. 1. Vignette 1: Management (diagnosis, physical investigations, referral or second appointment) by standardized patient (SP) gender. *$p < 0.05$.

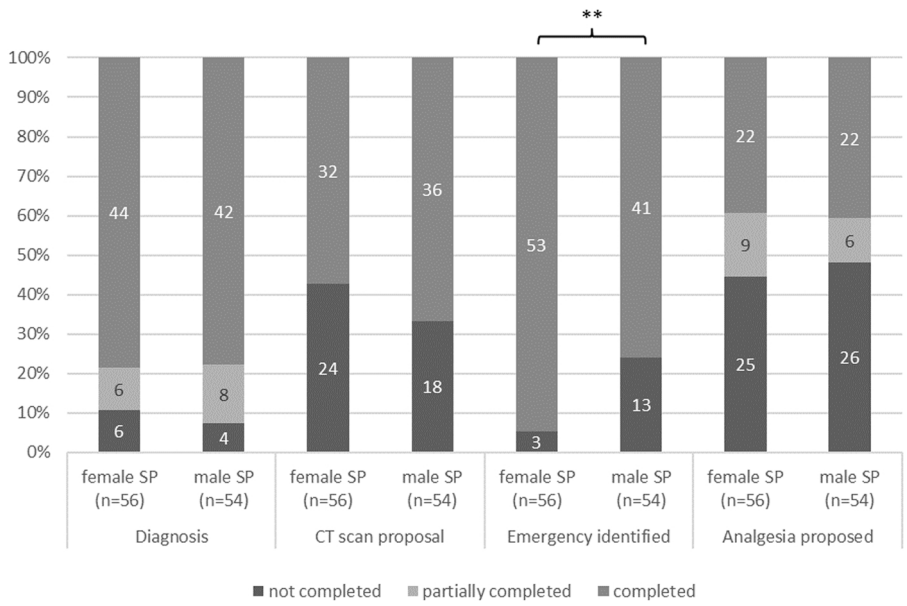

Fig. 3. Vignette 2: Management (diagnosis, CT scan proposal, emergency identification, analgesia) by standardized patient (SP) gender. CT: computed tomography. **p < 0.01.

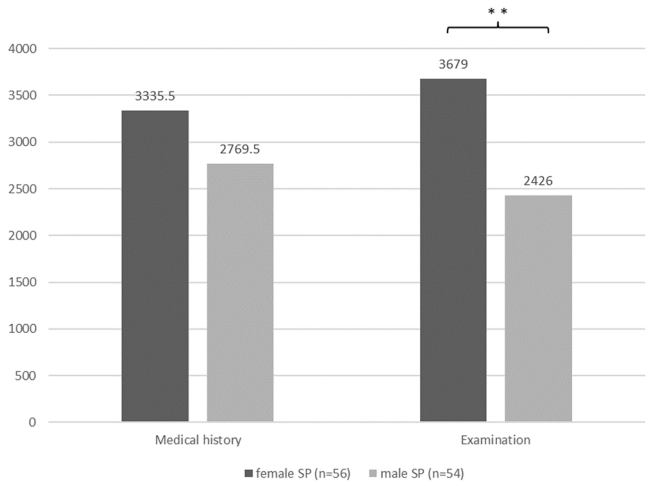

Fig. 4. Vignette 2: Total scores for medical history and physical examination by standardized patient (SP) gender. **p < 0.01.

gender bias has been identified in students before [25,26]. Identification of biases provides an opportunity not only to address their origins, but also to develop medical curricula that reduce these biases. Indeed, medical schools train physicians to become proficient in clinical reasoning [27] and clinical decision making; these biases can be reduced using specific medical education measures [14,28,29]. Medical schools therefore have an important role to play in implementing gender-sensitive healthcare. Different efforts have been successfully undertaken worldwide and should be spread further [2]. Efficient measures include reflective practice [30], teaching the teachers, and revising textbooks that urgently need it [13]. Literature has also shown that identifying key persons, responsible to carry gender sensitive project (such as the head of a clinical unit or a key participant of a medical education specialty, feeling responsible to make his/her unit gender sensitive) is an important measure, even a more efficient one than many other measures.

Multidimensional approaches, simultaneously employing several interventions, are more effective than individual interventions [2].

4.1.1. *Identified bias*

Students were more likely to diagnose GAD in female than in male SPs. This occurred even though the nature of the symptoms was better investigated in male SPs. Associated physical symptoms were more often discussed with male SPs. This is a well-described bias with psychiatric illness in general. Anxiety is more prevalent and easily accepted in women, and thus more likely to be attributed to women, putting men at risk of under-diagnosis [31,32]. Students in this study followed this trend. Other studies have similarly shown that diagnoses were more accurate in the population groups with a higher prevalence of disease. For example, one study, using a clinical vignette, demonstrated that family physicians were more likely to diagnose chronic obstructive pulmonary disease in male patients than in female patients [33].

Medical students were more likely to recognize AAD as an emergency, take a family history, characterize pain, and perform a complete physical examination in female SPs than in male SP; they were especially more likely to have their femoral pulses tested. These findings were surprising, as we expected aortic dissection to be considered as a masculine disease. These results can be considered congruent with the proven reality that an aortic pathologies are associated with higher mortality in women, even though they are more common in men [34]. Regarding the difference in the examination of inguinal folds, the finding might additionally be explained by the fact that this anatomical region is considered differently in men because of external genitalia. Indeed, gender bias in physical examination has already been described, for example by colleagues investigating cardiac examination, which was less precise in women because of the location of the breasts in the mitral area [35].

This study showed differences in management of male and female SPs with the same diagnoses. Understanding why students had different attitudes toward women and men is beyond the scope of this study and the variables collected. It would be interesting, however, to explore these reasons in future studies, for example, by using qualitative research.

4.1.2. *Absence of bias*

Students did not demonstrate a gender bias in the management of patients (i.e., decision making to perform a complementary examination or to refer the patient to a specialist for follow-up). This finding is unlike what has been shown in various medical conditions, for example, in a

real-life setting that measured the investigation of stable angina in women versus men [36]. Indeed, bias tends to appear when decisions are taken under pressure, stress, or emergency, as shown, for example, by colleagues making a cardiovascular diagnosis [25]. Such stress was minimized in our artificial and standardized setting which might have led to an underestimation of real bias in our study.

4.1.3. Strength and limitations

Our study has several strengths. It was set in standardized conditions, allowing bias to be measured in relation to gender because of the standardization of social determinants such as age, socio-economic status, and ethnicity. Despite the minimization of bias in the vignette setting, having SPs act as clinical cases is also closer to real interaction than written clinical vignettes. Furthermore, students, SPs, and examiners were all blinded to the purpose of the study, which is particularly important when studying unconscious bias.

Our study has some limitations. The clinical vignette setting with SPs is a good approximation of the reality experienced by patients and doctors in many ways, but it is still an exam and thus an artificial situation. Medical history and examination were probably performed more systematically and thoroughly compared with what would be done in a real context of emergency or primary care settings, limiting bias.

The small number of participants is another limitation and might explain why we did not find that student gender modified the effect of patient gender on the management of clinical situations.

4.2. Conclusion

This study brings new evidence of differences in evaluation of male and female patients, confirming gender bias among medical students in the evaluation of clinical situations of GAD and AAD. This is susceptible to lead to under-recognition of diseases (for example of anxiety in men).

4.3. Practice implications

Differences in evaluation of GAD and AAD in women compared to men by students exist. To improve inclusive care of patients, different efforts such as reflective practice, teach-the-teachers, revising textbooks and identifying key persons to carry gender projects, have been successfully undertaken worldwide and can continue to be implemented in other medical schools.

Ethics approval

The study was submitted to the Cantonal Ethics Committee for Research on Human Beings (CER-VD) for ethical approval (Req-2017-00335). Ethical approval was not required (decision on May 23, 2017).

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CRediT authorship contribution statement

CC, DG, MM, SF, MSB: Conception and design. **CC**: Acquisition of data. **JLB, CC**: Analysis and interpretation of data. **JLB, CC, DG, MM, SF, MSB**: Drafting and critical revision. All authors: Final approval.

Declaration of Competing Interest

The authors have no conflict of interest to declare.

Data availability

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request. Restrictions apply to the case vignettes described thoroughly in the text, which are only available after permission of the Faculty of Biology and Medicine of the University of Lausanne.

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Consent for publication

Not applicable.

Appendix 1

Vignette 1: generalized anxiety disorder: content and evaluation

The case was summarized as follows to students: *"A middle-aged patient presents to her or his family doctor's practice with generalized anxiety. The manifestations are an anxious feeling, trouble sleeping, agitation, and brooding over a hypothetical drama occurring in her or his family. The patient also mentions thoracic oppression when asked, and spontaneously presents anxiety about his/her financial situation without objective reasons. She or he seems tense, is talkative, and is somewhat focalized on her or his concerns, playing with the pen and often changing position."* Students were asked to take a medical history, propose investigations, arrive at a diagnosis, refer the patient, and/or reschedule the patient for a follow-up appointment (students were not asked to perform a clinical examination). Students were evaluated on the following: medical history (13 items: asking about the nature [characteristics] of symptoms; beginning, trigger, and evolution of symptoms; first episode or not; associated symptoms; symptoms of depression; suicidal thoughts; hallucinations; quality of sleep; substance abuse; helping strategies; previous medical history), arriving at a diagnosis, proposing further investigations and follow-up, and communication. Items of communication were rated on a 5-point scale from "completely" (5 points) to "not at all" (1 point). All other items were considered to be "completed" (2 points), "partially completed" (1 point), or "not completed" (0 points), with certain items of medical history only being "completed" (2 points) or "not completed" (0 points).

Appendix 2

Vignette 2: ascending aorta dissection: content and evaluation

The case was described as follows to students: *"An older patient of tall and slim build presents with acute chest pain. The pain is described as violent, extending to the shoulder blades, having started 2 h earlier. The patient has a cold feeling in his/her left foot. The patient is known for untreated hypertension. On examination, the patient is ill looking, has higher blood pressure on the right arm than on the left, and a diastolic murmur over the aortic area. The pulse is obliterated on the left leg."* Students are expected to recognize the vascular origin of pain and arrive at a diagnosis of type A aortic dissection. A secondary objective was to fulfill an appropriate clinical examination. Students were evaluated on the following: medical history (nine items: trigger, nature of pain, evolution of pain, dyspnea, accompanying symptoms, cardiovascular risk factors, previous medical history, medication, family medical history), clinical examination (five items: measurement of blood pressure, blood pressure on both arms, cardiac auscultation, femoral pulses, radial pulses), arriving at a diagnosis, proposing a computed tomography (CT) scan to confirm the

diagnosis, identifying the emergency, proposing analgesia, and communication skills. Points were attributed in the same manner as for Vignette 1.

Appendix 3

Score for vignette evaluation

We created scores to summarize the numerous points of medical history and physical examination (only in Vignette 2). Scores were created as the sum of all points through all items of one category of medical history or physical examination (only in Vignette 2). For Vignette 1, the global score for medical history summed to a maximum of 30 points per student (minimum 0 points). For Vignette 2, the score for medical history resulted in a maximum of 20 points, and the score for physical examination resulted in a maximum of 11 points.

Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at doi:10.1016/j.pec.2023.107655.

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