Scientific Writing

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➢ Why are papers important?

- Manuscripts (and grants) are the academic currency.
- It allows people to see how you think and how you write
- If your results are not written up and published, it is as if the study was never done.
- Publishing is necessary to stay in academics (it is important for grants and getting an academic position)
- Papers are necessary for promotion. If you don't want to be promoted, don't write any papers!
- If you have a patent do not publish before registering this patent

➢ Parts of scientific paper

AIMRaD

- **Abstract**
- **Introduction (background) + rationale (Aim/Purpose):**
  - **Why are you doing this?**
- **Methods (Procedures/Approach):**
  - **How did you do it?**
- **Results (Findings):**
  - **What did you find?**
- **Discussion + Conclusion (summary/implications):**
  - **How important is your findings?**

➢ Basic Rules for Writing

Writing should be:

- ***Specific***
- ***Clear***
- ***Concise***

Remember: **Writing is the not science, it is the marketing of science. The abstract must sell the Paper/Grant.**

- **The paper should be interesting (Who cares? So what? What happens if you do this?**
- **Always stick to the roles of where you're going to publish (structure, word count, characters count,…….(see instructions for authors)**

➢ Basic Rules for Writing

➢ Abstract

- **The abstract is a general summary/snapshot of your manuscript**
- **Last part to be written after the whole manuscript. Usually not more than 250 words.**
- **It is the most important part, most reviewers will decide about your paper from just the abstract. Also important for indexing/searching in database…….(FIRST IMPRESSIONS COUNT).**
- **It should contains:**
  - **Background (2-3 sentences),**
  - **Rationale (1 sentence),**
  - **Methods,**
  - **Results and**
  - **Conclusions.**

➢ Abstract

The NADPH oxidase (Nox) subunits 1, 2 (gp91 *phox*) and 4 are the major sources for reactive oxygen species (ROS) in cardiovascular system. In conditions such as ischemia-reperfusion injury and hypoxia, both ROS and adenosine are released suggesting a possible interaction. **We hypothesized that ROS generated through Nox is involved in adenosine-induced coronary flow (CF) responses.** Adenosine (10^{-8}-$10^{-5.5}$ M) increased CF in isolated hearts from wild type (WT; C57/BL6), A_1 adenosine receptor (AR) knockout (A_1KO), A_3AR KO (A_3KO) and A_1 and A_3AR double KO (A_1/A_3DKO) mice. The Nox inhibitors apocynin (10^{-5} M) and gp91 ds-tat (10^{-6} M) or the SOD and catalase-mimicking agent EUK134 (50 µM) decreased the adenosine-enhanced CF in the WT and all the KOs. Additionally, adenosine increased phosphorylation of p47-phox subunit and ERK 1/2 without changing protein expression of Nox isoforms in WT. Moreover, intracellular superoxide production was increased by adenosine and CGS-21680 (a selective A_{2A} agonist), but not BAY 60-6583 (a selective A_{2B} agonist), in mouse coronary artery smooth muscle cells (CASMCs) and endothelial cells (CAECs). This superoxide increase was inhibited by the gp91 ds-tat and ERK 1/2 inhibitor (PD98059). In conclusion, adenosine-induced increase in CF in isolated heart involves Nox2-generated superoxide, possibly through ERK 1/2 phosphorylation with subsequent p47-phox subunit phosphorylation. This adenosine/Nox/ROS interaction occurs in both CASMCs and CAECs, and involves neither A_1 nor A_3 ARs, but possibly A_{2A} ARs in mouse.

➢ Abstract

Cisplatin-induced nephrotoxicity limits its anticancer effectiveness, **thus this study's aim was to assess the potential modulatory effect of perindopril on cisplatin- -induced nephrotoxicity and to elucidate the possible underlying mechanisms.** Renal dysfunction was induced in mice by a single injection of cisplatin (10 mg kg–1, *i.p.*) and perindopril was administered orally (2 mg kg–1, once daily) for 5 days. Perindopril remarkably ameliorated cisplatin-induced perturbations in renal histology, renal levels of tumor necrosis factor-alpha, interleukin-6 and interleukin-10, apoptosis-regulating protein expressions (Bax and Bcl2), and partially normalized Bax to Bcl2 ratio and active caspase 3 protein expression. Conversely, perindopril had no significant effect on cisplatin-induced elevations in serum creatinine and urea, microalbuminuria, kidney to body weight ratio, lipid peroxidation marker, superoxide dismutase and catalase activities and reduced glutathione content. In conclusion, perindopril may be safely used with cisplatin in mice since it ameliorated cisplatin-induced histopathological changes, inflammation and apoptosis without affecting renal biomarkers or oxidative stress.

Cisplatin is one of the most efective chemotherapeutic agents against various malignancies. Unfortunately, its renal toxicity limits its clinical application.

➢ Introduction (Why?)

- Briefly describe the problem and gap in the literature
- Don't describe all of the background literature here, just the main or most important ones
- Hypothesis, aim or goal: clearly describe what your hypothesis is and how this adds to the literature
- **Example:** Role of drug X in hepatitis
  - Describe hepatitis and why it is important
  - Available drugs/pathways for treatment and why they are deficient
  - The pathway through which the drug X is working, and its relation to hepatitis or liver
  - Since the pathway of drug X is related to hepatitis, Therefore, this study aims to….., we hypothesized that……
- In general, Background , Existing research, Problems with that research and Your improvements

➢ Introduction (Why?)

- **Do not overestimate the importance of your work, be realistic and specific**

- **Use an objective tone when criticizing prior work?**
  - **They may be your reviewers!**

➢ Methods: Who, What, Where and How

- Briefly describe materials, animals, methods with references if possible and statistics.
- Materials, animals, kits and equipments from where (origin) and if possible Catalogue No.
- Animals age is better than their weights (Check growth charts)
- For drug doses, either use several doses, or use one with reference (why you choose this specific dose(s)?)
- Be careful for drug solubility (water or saline, CMC suspension OR in organic solvent then diluted with saline).
- If using natural extract, use either active constituent(s) or you must do standardization

➢ Methods: Who, What, Where and How

- **Anesthesia……be careful of what organ it affects (Ex. Ether and liver), and if it is terminal (Ex. Urethane) or not**

- **Avoid stress, it can affect many parameters (Ex. Serum glucose, endothelins,……)**

- **Know the deficiency in each method you use. For example:**
  - **TBARs (MDA) is not specific**
  - **If you measured gene expression, what about protein expression and/or activity?**
  - **Time of change, some parameters may change overtime (Ex. CK-MB) while others need time for change (Ex. Gene expression not less than 2-4 hours).**
  - **Some animals are known to resist some disease models (Ex. Rodents and dyslipidemia).**

➢Results: what you found

- The results section should contain results. No interpretations, no references
- Describe what you found and do not present conclusions here. You can use fold or % change. Otherwise, describe actual numerical change
- <u>Be careful:</u>
  - Are the baseline (control) values consistent with literature
  - Are changes logic (Ex. these levels can be reached by this model in that time)
  - Some data are related, check for integrity (example, lipid profile)
  - If you have standard curve or the kit sensitivity range, check that your data are not out of range
  - Statistics…….they can make your data significant or not (your choice of tests is very important)
  - Avoid % change of % Data
- Report all results (except if many groups, some controls can be omitted if not significantly different)
- Include tables and/or graphs as much as possible (makes the data clearer)
- Present original data: gels, blots, histology, ECG traces,…..

➢Results: what you found

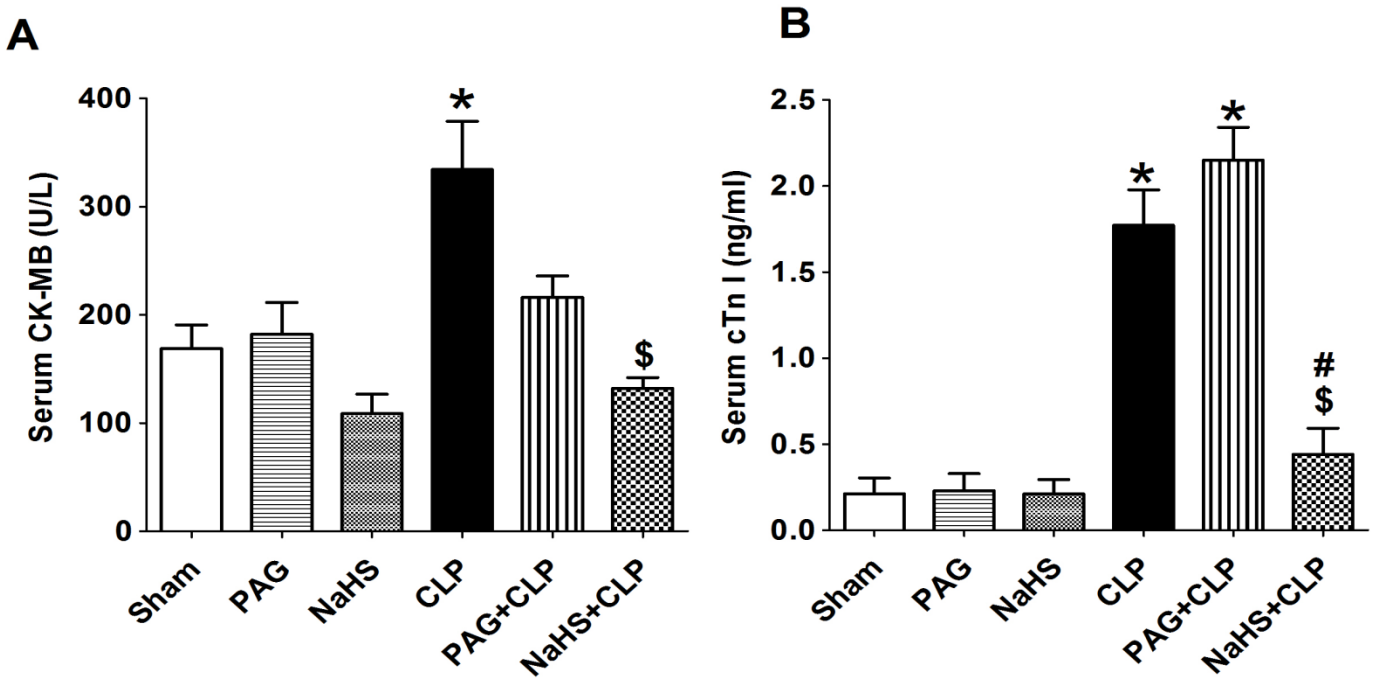


Figure (1): Effect of PAG and NaHS on CLP-induced increase in cardiac, inflammatory and cytotoxicity biomarkers in rats:

PAG (50 mg/kg, i.v.) or NaHS (0.8 mg/kg, i.v.) were injected 30 min before induction of CLP and serum were collected 24 h after CLP.

Data are expressed as mean ± SEM, n=8.

A) serum creatine kinase (CK-MB) and B) serum cardiac Troponin I (cTnI).

*, $^{\$}$, $^{\#}$ $p<0.05$, significantly different from sham, CLP, or PAG+CLP group respectively using one-way ANOVA followed by Tukey-Kramer multiple comparisons *post hoc test*……(Abbreviations)

➢Results: what you found

Table (1): Effect of PAG and NaHS on H.R and mortality changes induced by CLP in rats:

Group	% Increase in H.R	% Mortality
Sham (n= 8)	5.2 ± 1.3	0
PAG (n= 8)	5.8 ± 2.4	0
NaHS (n= 8)	4.2 ± 1.5	0
CLP (n= 15)	**30.1 ± 4.5** *	**47.9** #
PAG+CLP (n= 17)	**24.8 ± 5.7** *	**58.3** #
NaHS+CLP (n= 17)	**9.9 ± 3.15** $	24.2

PAG (50 mg/kg, i.v.) or NaHS (0.8 mg/kg, i.v.), were injected 30 min. before induction of CLP. Changes in H.R and mortality were calculated 24h after CLP.

***, $ significantly different from sham or CLP group respectively using one-way ANOVA followed by Tukey-Kramer multiple comparisons *post hoc test* at p< 0.05.**

 # significantly different from sham group using Kruskal-Wallis test followed by Dunn's *post hoc test* at p< 0.05……..(Abbreviations)

➢Discussion: interpretation of the results

- **Describe briefly what you found in the first paragraph (non-numerical/ not a replicate of results).**

- **Describe the problem (Ex. Diabetes, hepatitis), how previous studies measure it then in this study you measured A, B, and C that indicates the presence of the problem. Furthermore, we measured D and E which are more specific and we found that they……confirming the presence of this experimental disease model.**

- **Then, describe the mechanism(s) that relate the problem to your drug/intervention. For example, inflammation has been associated with diabetes. X et al have shown that in diabetic rats TNF is increased after…… Additionally, NFK is increased in …(model)…..(References). In this study, we found that TNF OR IL-1 OR……..is increased OR decreased after……. Moreover NFK decreased or increased ……confirming that inflammation is associated with diabetes.**

➢Discussion: interpretation of the results

- Since drug X activates/inhibits this inflammation pathway, we tested its involvement in diabetes/hepatitis. Drug X decreased/increased markers (A, B, C……) indicating its ability to prevent the problem. Furthermore/additionally/conversely it decreased/increased inflammation markers (IL-1, TNF,……). This indicates that drug X can prevent the problem through blocking/decreasing/suppressing/increasing/activating……..the inflammatory pathway…….

- Previous studies (if applicable) have shown that drug X did not inhibit the problem (References). However, these studies used rabbits, not rats as in this study (OR in vitro vs in vivo…….OR …..the dose of drug X was different…….. OR……the model was different. This may explain the discrepancies in results……..(WHY YOUR STUDY IS DIFFERENT/ BETTER)

- Describe the importance of your findings (this could represent a new therapeutic pathway for treatment/prevention of hepatitis/diabetes…….)

- When compare your results to what is out there, include relevant studies only, be focused and do not present complete literature review

- Limitations: list up front what the limitations of your study are or else reviewers will do it for you.

➢Conclusions, Acknowledgement and Conflict of interest and Financial support

- **Outline conclusions:** Briefly confirm what your study found, its importance and where should the field go next?
- **Acknowledgement:** Include people who helped you with the paper, but may not have contributed enough to be an author. Anyone acknowledged should be told.
- **Conflict of Interest:** Is there any for all the authors? Ex. Any one of authors is related to a drug company that the research is about?
- **Financial support:** Public, private, none…….

➢Notes/ Common writing problems

- **Title should be interesting, informative but specific (check character limit for the journal)**
- **References should be updated, USE REFERENCE/CITATIONS SOFTWARE (Ex. EndNote OR Mendeley, …..).**
- **Write the paper as you do your experiments (Introduction and methods at least)**
- **Give your manuscript to your colleagues for feedback and editing (TWO EYES ARE BETTER THAN ONE EYE)**
- **Writing well does not come easy to most people**
- **Print and Read what you have written and revise before you give it to other people to read.**

➢Notes / Common writing problems

- **Use linking words: However, indeed, rather, moreover, on the other hand, by contrast, furthermore, additionally, conversely, in comparison, surprisingly, and consistent with…**

- **Use the correct verb tense in each manuscript section:**
  - **Introduction: present tense**
  - **Methods and results: past tense**
  - **Discussion: past tense for your results you just presented**

  (THESE ARE NOT ALWAYS APPLICABLE)

- **Write the easy sections first: methods or results**

- **Remember to define all abbreviations**

- **Develop a thick skin**

- **Don't try and convince reader it was the right/best research, BE REALISTIC, BE SPECIFIC**

➢Notes / Common writing problems

- **Use the active rather than the passive voice (e.g., "The study tested" rather than "It was tested in this study")**

- **Use third person, not first: Avoid "I," "we," "my"**

- **Avoid Redundancies:**
  - **circle around; final outcome; new innovations; particular interest; summarize briefly; shorter/longer in length; puzzling in nature; already existing; completely eliminate; basic fundamentals; estimates roughly at; period of time; main essentials; true facts.**

- **Avoid Abbreviated Redundancies:**
  - **HIV virus = Human Immunodeficiency Virus;**
  - **AIDS syndrome = Acquired Immunodeficiency Syndrome;**
  - **CPU unit = Central Processing Unit**

- **Avoid Useless and Emotional Intensifiers:**
  - **Really, always, very, quite, extremely, severely, clearly, certainly, essentially, actually**

➢Notes / Common writing problems

- **Use Simpler Vocabulary:**
  - **A large number of = many;**
  - **As a general rule= generally;**
  - **Exhibits the ability= can;**

- **Put the Action into the Verb:**
  - **Make decision -decide**
  - **Cause a decrease –decreased**
  - **Have a tendency-tend**

- **Avoid Weak Verbs: be, have, do, make, cause, provide, get, seem**

- **Avoid Noun Clusters: Do not add another noun to an existing noun pair:**
  - **Blood flow disturbances--- disturbances in blood flow;**
  - **Protein metabolism elevation---- elevations in protein metabolism**
  - **Lung function variability----- variability in lung function.**

- **Don’t overdo the bold and underlines and italics and all three**

➢Notes / Common writing problems

- **Keep abbreviations to a minimum (not several abbreviations in the same sentence).**

- **<u>Sentences are better understood if the subject and verb are not interrupted:</u>**
  - **Estrogen, through engagement of membrane receptors, stimulates rapid endothelial cell signaling. (X)**
  - ***Estrogen stimulates rapid endothelial cell signaling through engagement of membrane receptors. (√)***

- **Write Shorter Sentences (≈20-22 words); Easy to understand**

- **<u>Avoid ambiguous comparisons:</u>**
  - **Our results are similar to previous studies. (X)**
  - ***Our results are similar to the results of previous studies.(√)***
  - ***Our results are similar to those of previous studies.(√)***

- **Go From Old to New**

➢Plagiarism

- **"Presenting work or ideas from another source as your own, with or without consent of the original author, by incorporating it into your work without full acknowledgement"**.

- **Plagiarism literally means 'stealing' someone else's intellectual property.**

- **Note: There is also self-plagiarism…. Re-using your own words**

How to avoid plagiarism:

1- Paraphrasing (using your own words)

- ➢Break up long sentences
- ➢Combine short sentences
- ➢Use synonyms [use a Thesaurus]

2- Always acknowledge the sources in two places:

- ➢Within the essay
- ➢At the end, in a list of References

3- Quotation (using exactly the same words)

- **Always check for plagiarism before submitting your work (ithenticate, Turnitin, Scribbr, Grammarly, ……)**

- **Several software now can detect AI Writing**

➢Choosing a journal for submitting your paper

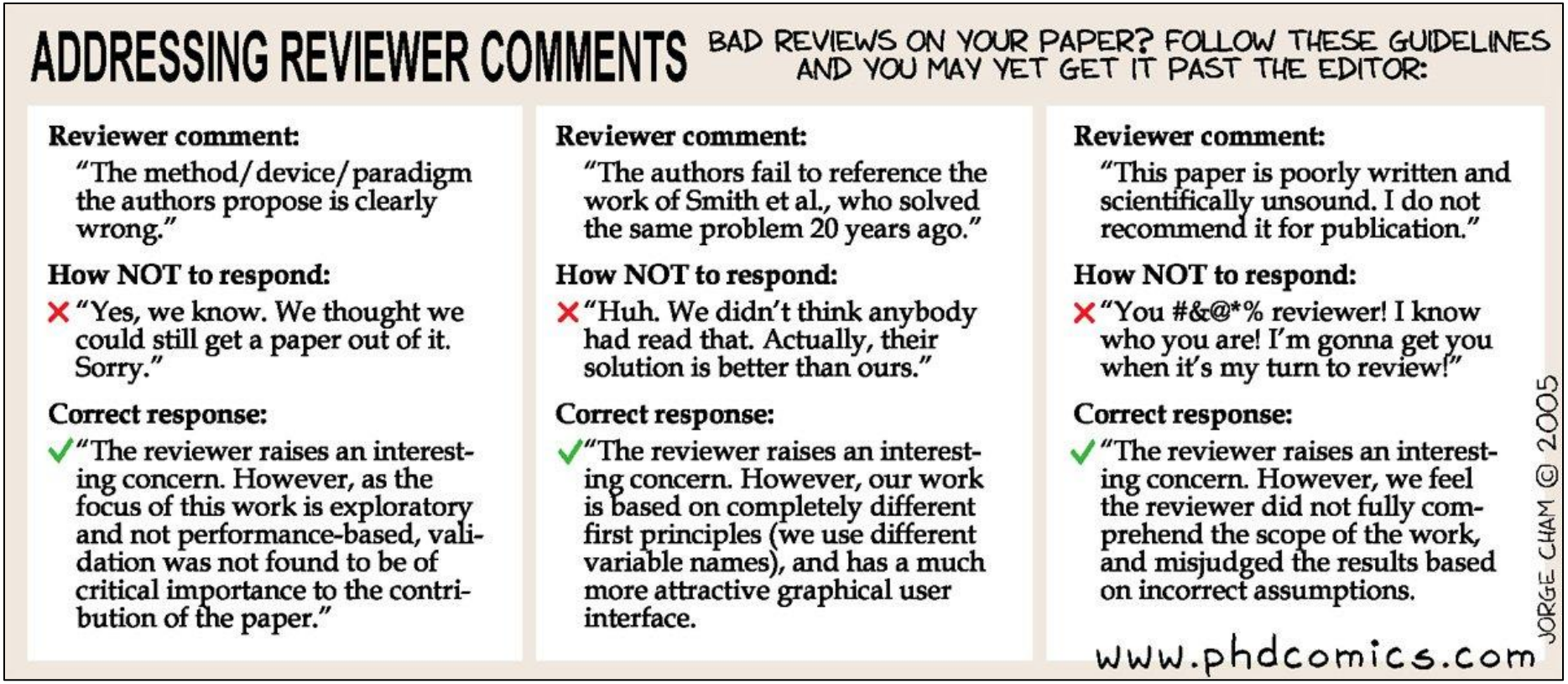
Check the following before submitting to a journal:

- **What is the scope of the journal? Check some papers published**
- **What is the impact factor (IF, JCR) and Q percentile (JCR) …. Also check its history.**
- **Is your work similar or near to these published papers in the journal chosen?**
- **Is it free or NOT?**
- **Time to review and time to publish (check already published papers)**
- **Read Instructions for Authors (what are the requirements to submit)**

➢ Submitting your paper

- **All authors MUST review and approve the paper before submission**
- **Logon to the journal website to submit a new manuscript**
- **Most journals use one of the four submission systems**
  - **ScholarOne (Clarivate; formerly Manuscript Central)**
  - **Editorial Manager (Aries Systems)**
  - **EJPress (eJournalPress)**
  - **ReView (River Valley Technologies)**
- **Enter details of manuscript, authors, keywords, area of research, abstract, etc.**
- **Upload your files**
  - Your manuscript
  - Figure files (mostly JPG, at least 300 dpi)
  - Table files
  - Any extra files such as supplemental material, graphical abstract,.....
- **Enter additional information (suggested reviewers, funding, conflict of interest, …..etc.).**
- **Review and submit.**

➢ Submitting your paper



➢ Submitting your paper

➢ Artificial Intelligence (AI) Tools

https://doi.org/10.1038/s41585-023-00746-x

Artificial intelligence in academic writing: a paradigm-shifting technological advance

Roei Golan, Rohit Reddy, Akhil Muthigi & Ranjith Ramasamy

Check for updates

Artificial intelligence (AI) has rapidly become one of the most important and transformative technologies of our time, with applications in virtually every field and industry. Among these applications, academic writing is one of the areas that has experienced perhaps the most rapid development and uptake of AI-based tools and methodologies. We argue that use of AI-based tools for scientific writing should widely be adopted.

The integration of AI into academic writing streamlines the creative and writing process, increasing productivity and content. The research process can present challenges, particularly for trainees or young investigators with limited experience. Frequently, the most difficult stage of a research project is generating a hypothesis and initiating a study. Groups with limited experience could benefit tremendously from AI, as it might stimulate a creative process in a particular field of interest and/or identify gaps in the literature[2]. We demonstrated this application through an experiment in which we used ChatGPT (Box 1) to generate project ideas in the field of male reproductive health[3]. The model currently only has access to publications up to 2021 and might not have comprehensive access to previous publication literature, but the AI algorithm was able to propose novel and relevant topics that we have explored over the past 12 months[4–6].

The use of AI in academia has proved to be a valuable tool in stream-

➢ Artificial Intelligence (AI) Tools

Current artificial intelligence tools that can be used in academia

For literature review[a]

Semantic Scholar provides access to scientific literature in practically every academic field. Researchers can efficiently locate relevant papers and studies to support their own research or writing. Writers can also use this tool to discover new papers and authors and institutions that are working on related topics.

Penelope.ai analyses and understands large sets of text, such as scientific papers or research articles, to help writers identify key themes, concepts and trends in the literature.

Elicit helps scientific writers find published manuscripts that might not be regularly indexed by existing databases, aiding discovery of new and emerging research that can support their own writing.

For writing[b]

Writefull improves grammar, style and readability of inputted writing. It can help researchers submit more polished and professional writing.

CoSchedule Headline Analyzer is a tool that specifically helps with manuscript title creation. It can analyse inputted headlines and suggest modifications based on word balance, length and structure. CoSchedule helps writers create headlines that are more engaging and effective.

Quillbot is a tool that uses machine learning algorithms to reduce syntax complexity and increase clarity.

Wordtune uses automated feedback on grammar, style and readability.

ChatGPT is an OpenAI tool that has a chatbot–user interface that can be used to clarify, fine-tune and polish excerpts of writing. It can also be used to plan study design and statistical approaches.

Combined literature review and writing[b]

Cohere can be used by researchers and scientific authors to generate summaries, outlines and entire manuscript sections based on a given set of sources.

Figures

DALL-E 2 is an OpenAI tool that can be used to generate images from text descriptions. This tool can be useful for creating visual aids to support the writing, making it more engaging and easier to understand. Currently, this tool is primarily used to generate creative illustrations.

[a]Pitfalls of artificial intelligence (AI)-powered literature review tools are their limited access to indexed databases, potentially inaccurate algorithms being used to understand bulk text, and the cost of these tools making them prohibitive to some researchers. [b]Pitfalls of AI-assisted academic writing are a potential lack of human-authored nuance in the writing, reduced originality and creativity, and few people have an understanding of the interfaces or can afford the tools. Anecdotally, when asked to do a systematic review on the effect of vasectomy on lower urinary tract symptoms, the AI tool ChatGPT generated ten studies and a relative risk when only two studies evaluated the potential association.

Thank you