

# Supplementary Data 1. A Guide to Writing Research Articles Using Large Language Models

## INTRODUCTION

In recent years, large language models (LLMs) have emerged as powerful tools for various natural language processing tasks, including text generation, summarization, and question answering. These artificial intelligence (AI)-powered models, such as OpenAI's GPT series and Anthropic's Claude, have the potential to revolutionize the way researchers approach academic writing.

This guide aims to provide a comprehensive overview of how researchers can leverage LLMs to streamline the process of writing research articles. By utilizing LLMs at various stages of the writing process, from literature review to editing and finalization, researchers can enhance their productivity and the quality of their work.

## LEVERAGING LLMS FOR LITERATURE REVIEW AND RESEARCH PLANNING

### Searching for relevant papers using LLM-based tools

LLM-based tools like Perplexity, Elicit, and Consensus can help researchers quickly identify relevant papers for their research. These tools analyze the researcher's input, such as research questions or keywords, and provide a list of pertinent papers, along with their summaries and relevance scores. Also, in case of when the researcher is capable of programming, the researcher can develop their own custom paper search system by combining LLMs with APIs like Entrez PubMed Search or Semantic Scholar Academic Graph. By feeding the researcher's notes, hypotheses, or draft content to the LLM, the system can generate targeted search terms, retrieve relevant papers, and rank them based on their relevance to the research topic.

### Reading and understanding papers with LLM-powered tools

Tools like SciSpace, ChatPDF, ChatDOC, and ExplainPaper leverage LLMs to help researchers quickly grasp the key concepts and findings of research papers. These tools can generate summaries, answer questions, and provide explanations of technical terms, allowing researchers to efficiently process a large volume of literature.

### Generating research plans based on reference papers

By inputting the research topic and a few key reference papers, researchers can use LLMs to generate a research plan outline. The LLM can suggest data collection methods, analysis techniques, and potential discussion points based on the content of the referenced papers.

## DATA ANALYSIS AND VISUALIZATION WITH LLMS

LLMs that are integrated with code execution tools like ChatGPT Data Analyst can provide valuable insights and suggestions for data analysis. By inputting the research data and asking for analysis ideas, researchers can receive creative and targeted suggestions for exploring their data. These tools can also assist in creating data visualizations by generating code snippets for popular data visualization libraries. Researchers can input their data and specify the desired type of visualization, and the LLM will provide the necessary code. The generated visualizations can be further customized by natural language interactions.

## WRITING THE RESEARCH ARTICLE WITH LLMS

### Outlining and structuring the article

Researchers can use LLMS to create an outline for their research article. By providing the LLM with any kind of research context, such as figure legends, list of keywords or even a transcript of a discussion, and asking for an outline, researchers can quickly generate a structure for their paper. The outline can be iteratively refined by asking the LLM to add more details or reorganize sections.

### Combining LLM-generated content with personal notes

To maintain originality and avoid over-reliance on LLM-generated content, researchers should combine the LLM-generated outlines and sections with their own notes and ideas. This can be achieved by using note-taking methods like the Zettelkasten system and integrating personal insights and interpretations into the LLM-generated framework.

### Writing the first draft and iteratively polishing with LLM assistance

To maintain originality, develop writing skills, and avoid over-reliance on LLM-generated content, researchers should write the first draft of their article in their own words. This approach ensures that the article reflects the researcher's unique perspective and understanding of the subject matter while also helping them identify areas for improvement in their writing.

After completing the first draft, researchers can use LLMS to iteratively refine and polish their writing. By asking the LLM for targeted feedback on clarity, coherence, and impact, researchers can receive valuable suggestions for improvement. This iterative process allows researchers to learn from the LLM's insights and enhance their writing skills over time. However, it is crucial for researchers to maintain control over the final content and ensure that the article adheres to the standards of academic integrity.

## EDITING AND FINALIZING THE ARTICLE

### Using LLMS for critical thinking and peer review simulation

LLMS can be used to simulate the peer review process by asking them to critique the article from the perspective of a strict reviewer. This can help researchers identify potential weaknesses in their arguments, alternative explanations for their findings, and areas that require further clarification or elaboration.

### Generating additional content (e.g., title, abstract, keywords)

Researchers can leverage LLMS to generate multiple candidates for titles, abstracts, and keywords for their articles. By providing the LLM with the completed manuscript and asking for suggestions, researchers can quickly create engaging and informative supplementary content, such as ideas for summary tables or outline for a graphical abstract.

### Crafting a cover letter with LLM assistance

LLMS can also assist in drafting cover letters to journal editors. By inputting the manuscript details and any specific requirements or guidelines, researchers can generate a professional and persuasive cover letter that highlights the key contributions and significance of their work.

## CONSIDERATIONS WHEN USING LLMS

### Scaffolding academic writing skills

While LLMS can be powerful tools for academic writing, it is essential for researchers to use them as a means to scaffold and develop their own writing skills. Researchers should gradually reduce their reliance on LLM-generated content and focus on learning from the

LLM's suggestions and techniques to improve their writing.

## **Publisher policies regarding LLM usage**

Researchers must be aware of and adhere to publisher policies regarding the use of LLMs in academic writing. Many publishers require authors to disclose the use of text generation tools and emphasize that the responsibility for the article's content lies with the authors. Always refer to the author guidelines and do not hesitate to contact the editorial office to clear any uncertainties with the journal's AI disclosure policy.

## **Avoiding plagiarism and maintaining authorship integrity**

To avoid plagiarism when using LLMs, researchers should always write the original draft in their own words and iteratively refine the content. Keeping a versioned history of the manuscript and gradually reducing the proportion of LLM-generated text can help ensure the originality and integrity of the work.

## **Privacy and security concerns**

When using LLMs, researchers should be mindful of privacy and security concerns since any interaction with the AI chatbot can be recorded in the server and can be used as training data of the LLM. Check the privacy and personal information protection policies of your LLM service supplier. It is recommended to disable chat history and training data sharing in the LLM settings or use local LLM models in case of handling sensitive information.

## **CONCLUSION**

LLMs have the potential to revolutionize the way researchers approach academic writing. By leveraging LLMs at various stages of the research and writing process, from literature review to editing and finalization, researchers can enhance their productivity, creativity, and the overall quality of their work. To maximize the benefits of using LLMs in research article writing, it is crucial for researchers to develop their own skills and understanding of how to effectively prompt and interact with these tools. Additionally, using high-quality LLMs instead of ChatGPT-3.5 can ensure better results and a more seamless writing experience. As researchers become more adept at leveraging LLMs, they can unlock new possibilities for efficient and impactful academic writing in the era of AI.

# Supplementary Data 2

Editorial review

## Advances in Cancer Research, Cardiovascular Health, and Inflammatory Mechanisms

### INTRODUCTION

The Korean Journal of Physiology & Pharmacology has recently published a series of compelling articles that shed light on various aspects of human health and disease. The research spans several key areas, including cancer biology, cardiovascular physiology, and inflammatory mechanisms. This editorial review aims to summarize and discuss the main themes and findings of these studies.

### CANCER BIOLOGY AND THERAPEUTIC INTERVENTIONS

Several articles focused on elucidating the mechanisms underlying different types of cancer and exploring potential therapeutic strategies. Hou et al. delved into the role of ferroptosis, a novel form of programmed cell death, in gastric and colorectal cancers [1]. They highlighted the susceptibility of cancer cells to ferroptosis due to their heightened iron requirements and discussed the promise of targeting this pathway to enhance treatment efficacy. In another study, Choi et al. investigated the anticancer potential of tivozanib, a vascular endothelial growth factor receptor inhibitor, in oral squamous cell carcinoma (OSCC) [2]. Their findings demonstrated that tivozanib effectively inhibited OSCC cell viability and induced apoptosis, while also suppressing epithelial-to-mesenchymal transition, suggesting its potential as a therapeutic agent. Lin et al. designed and synthesized a novel artesunate-metformin conjugate, AM2, which exhibited potent inhibitory effects on bladder cancer cell growth by targeting the Clusterin/SREBP1/FASN signaling pathway and reducing lipogenesis [3]. Lastly, Shan et al. explored the role of RNA polymerase I subunit D (POLR1D) in colorectal cancer (CRC) and found that its overexpression, activated by the transcription factor Yin Yang 1 (YY1), promoted CRC cell proliferation and angiogenesis through the p38 MAPK signaling pathway [4]. Together, these studies provide valuable insights into the complex mechanisms driving various cancers and propose novel therapeutic targets and strategies.

### CARDIOVASCULAR HEALTH AND MITOCHONDRIAL FUNCTION

Two articles focused on cardiovascular health and the role of mitochondria in ischemia-reperfusion (IR) injury. Jang et al. investigated the potential of mitochondrial transplantation as a therapeutic approach for IR injury in rat hearts [5]. They found that transplanting healthy mitochondria isolated from autologous muscle into IR-damaged hearts improved mitochondrial oxygen consumption capacity and altered the expression of genes related to fatty acid metabolism, suggesting a protective effect against IR damage. In a separate study, Zhu et al. explored the neuroprotective effects of dexmedetomidine in a rat model of cerebral IR injury [6]. They demonstrated that dexmedetomidine attenuated blood-brain barrier disruption, neuroinflammation, and brain injury by inhibiting the activation of JNK and p38 MAPK signaling pathways and promoting M2 microglial polarization. These findings highlight the importance of mitochondrial function and inflammatory signaling in the context of IR injury and propose novel therapeutic interventions.

### INFLAMMATORY MECHANISMS AND AUTONOMIC REGULATION

Two articles investigated inflammatory mechanisms and their relationship with autonomic regulation. He et al. studied the antitussive effects of pectolarigenin (PEC) in a mouse model of cough [7]. They found that PEC alleviated lung tissue injury, reduced inflammatory factor release, and inhibited cough frequency and airway remodeling by suppressing the Ras/ERK/c-Fos pathway. Rajan et al. explored the relationship between heart rate variability (HRV) and quantitative electroencephalogram (qEEG) parameters in chronic neuropathic pain (CNP) patients [8]. They observed reduced HRV and altered qEEG patterns in CNP patients compared to healthy controls, with a

significant correlation between the low frequency/high frequency ratio in HRV analysis and various qEEG frequency bands, suggesting autonomic dysregulation in CNP. These studies emphasize the intricate interplay between inflammatory processes and autonomic regulation in the context of respiratory and pain-related disorders.

## CONCLUSION

In conclusion, the recent articles published in The Korean Journal of Physiology & Pharmacology cover a wide range of topics related to human health and disease, with a particular focus on cancer biology, cardiovascular health, and inflammatory mechanisms. The findings presented in these studies contribute to our understanding of the complex processes underlying various pathological conditions and propose novel therapeutic strategies and targets. As research in these areas continues to evolve, it is hoped that the insights gained will translate into improved diagnostic and treatment options for patients.

## REFERENCES

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# Supplementary Data 3

## Plain Language Highlights

### Exciting Discoveries in Physiology and Pharmacology - From Cancer Treatment to Heart Health

The Korean Journal of Physiology & Pharmacology has recently published a fascinating array of studies that shed light on potential new therapies for some of humanity's most pressing health challenges. The research spans a wide range of topics, from cancer and cardiovascular disease to chronic pain and brain injury. Let's take a closer look at some of the key themes and findings.

#### PROMISING CANCER TREATMENTS

Several papers explore novel approaches to treating various types of cancer. One study found that a compound called AM2, derived from artesunate and metformin, effectively inhibited the growth of bladder cancer cells by reducing lipogenesis and regulating key signaling pathways. Another investigated the potential of tivozanib, a drug that inhibits blood vessel growth, as a treatment for oral squamous cell carcinoma. The results showed that tivozanib not only reduced cancer cell viability but also suppressed processes involved in metastasis. Additionally, researchers discovered that a protein called POLR1D, when activated by the transcription factor YY1, promotes the proliferation and blood vessel formation in colorectal cancer cells. These findings offer hope for the development of targeted, more effective cancer therapies.

#### PROTECTING THE HEART AND BRAIN

Two studies focused on strategies to protect vital organs from damage. In one, researchers found that transplanting healthy mitochondria (the energy-producing structures within cells) into rat hearts injured by ischemia-reperfusion (a model of heart attack) helped restore heart function and oxygen consumption capacity. This suggests that mitochondrial transplantation could be a potential treatment for ischemic heart disease. The other study investigated the effects of dexmedetomidine, a sedative drug, on rats with ischemia-reperfusion brain injury. The results showed that dexmedetomidine reduced brain damage, brain swelling, and inflammation by inhibiting specific signaling pathways. This highlights the potential of dexmedetomidine as a neuroprotective agent.

#### INSIGHTS INTO CHRONIC PAIN

One study explored the relationship between heart rate variability and brain activity in patients with chronic neuropathic pain. The researchers found that these patients exhibited reduced heart rate variability and increased activity in certain brain wave frequencies compared to healthy controls. Interestingly, the balance between the sympathetic and parasympathetic nervous systems correlated with specific brain wave patterns in the chronic pain patients, but not in the healthy individuals. These findings underscore the complex interplay between the brain and heart in chronic pain conditions and may guide the development of new diagnostic and therapeutic approaches.

#### OTHER NOTABLE FINDINGS

A study on ferroptosis, a form of programmed cell death involving iron accumulation and lipid peroxidation, reviewed its potential role in treating gastric and colorectal cancers. Another paper reported that pectolarigenin, a natural compound, alleviated airway inflammation and remodeling in a mouse model of cough, suggesting its potential as an antitussive agent.

In conclusion, these studies demonstrate the remarkable progress being made in physiology and pharmacology research. From uncovering new therapeutic targets for cancer and chronic pain to developing strategies to protect the heart and brain from injury, these

findings provide valuable insights that could eventually translate into improved patient care. As scientists continue to unravel the complex mechanisms underlying health and disease, we can look forward to more breakthroughs that will shape the future of medicine.

## 생리학과 약리학의 흥미로운 발견들 - 암 치료에서 심장 건강까지

최근 발간된 한국 생리학·약리학 저널에는 암, 심혈관 질환, 만성 통증, 뇌 손상 등 인류의 가장 시급한 건강 문제에 대한 잠재적인 새로운 치료법을 조명하는 다양한 연구들이 실렸습니다. 주요 주제와 연구 결과를 자세히 살펴보겠습니다.

### 유망한 암 치료법

여러 논문에서 다양한 유형의 암을 치료하기 위한 새로운 접근법을 모색하고 있습니다. 한 연구에 따르면 아르테미시닌과 메트포르민에서 파생된 AM2라는 화합물이 지질 합성을 줄이고 주요 신호 전달 경로를 조절함으로써 방광암 세포의 성장을 효과적으로 억제했습니다. 또 다른 연구는 혈관 성장을 억제하는 약물인 티보자닙의 구강 편평세포암종 치료 가능성을 조사했습니다. 그 결과 티보자닙이 암세포의 생존력을 감소시킬 뿐만 아니라 전이와 관련된 과정들을 억제하는 것으로 나타났습니다. 또한 연구자들은 YY1이라는 전사 인자에 의해 활성화될 때 POLR1D라는 단백질이 대장암 세포의 증식과 혈관 형성을 촉진한다는 사실을 발견했습니다. 이러한 발견은 표적화되고 보다 효과적인 암 치료법 개발에 대한 희망을 제시합니다.

### 심장과 뇌 보호

두 연구는 중요한 장기를 손상으로부터 보호하기 위한 전략에 초점을 맞추었습니다. 첫째, 연구자들은 허혈-재관류(심장마비 모델)로 인해 손상된 쥐의 심장에 건강한 미토콘드리아(세포 내 에너지 생산 구조)를 이식하면 심장 기능과 산소 소비 능력이 회복되는 것을 발견했습니다. 이는 미토콘드리아 이식이 허혈성 심장 질환의 잠재적 치료법이 될 수 있음을 시사합니다. 다른 연구에서는 진정제인 텍스메테토미딘이 허혈-재관류 뇌 손상이 있는 쥐에 미치는 영향을 조사했습니다. 그 결과 텍스메테토미딘이 특정 신호 전달 경로를 억제함으로써 뇌 손상, 뇌 부종, 염증을 줄이는 것으로 나타났습니다. 이는 텍스메테토미딘의 신경보호제로서의 가능성을 강조합니다.

### 만성 통증에 대한 통찰

한 연구는 만성 신경병증성 통증 환자에서 심박 변이도와 뇌 활동 사이의 관계를 탐구했습니다. 연구자들은 이러한 환자들이 건강한 대조군에 비해 심박 변이도가 감소하고 특정 뇌파 주파수의 활성이 증가하는 것을 발견했습니다. 흥미롭게도 만성 통증 환자에서는 교감신경과 부교감신경 사이의 균형이 특정 뇌파 패턴과 상관관계가 있었지만, 건강한 사람에서는 그렇지 않았습니다. 이러한 발견은 만성 통증 상태에서 뇌와 심장 사이의 복잡한 상호 작용을 강조하며, 새로운 진단 및 치료 접근법 개발에 도움을 줄 수 있습니다.

### 다른 주목할 만한 발견들

철 축적과 지질 과산화를 수반하는 프로그램된 세포 사멸의 한 형태인 페롭토시스에 관한 한 연구에서는 위암과 대장암 치료에서의 잠재적 역할을 검토했습니다. 다른 논문에서는 천연 화합물인 펙톨리나리제닌이 기침 동물 모델에서 기도 염증과 재구성을 완화시키는 것으로 보고되어 진해제로서의 가능성을 시사했습니다.

결론적으로, 이러한 연구들은 생리학과 약리학 연구에서 이루어지고 있는 주목할 만한 진전을 보여줍니다. 암과 만성 통증에 대한 새로운 치료 표적을 발견하는 것에서부터 심장과 뇌를 손상으로부터 보호하기 위한 전략을 개발하는 것에 이르기까지, 이러한 발견들은 궁극적으로 환자 치료 개선으로 이어질 수 있는 귀중한 통찰력을 제공합니다. 과학자들이 건강과 질병의 근간이 되는 복잡한 메커니즘을 계속 밝혀내면서, 우리는 의학의 미래를 형성할 더 많은 돌파구를 기대할 수 있습니다.