

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ



# *How to write a scientific paper?*

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# What is a scientific paper?

- Writing communicates the answer to the scientific questions that you asked!
- “The goal of scientific research is publication...A scientific experiment is not complete until the results are published.”



# The goals for publication

- To add the contribution to the knowledge world
- To convey knowledge to the community
- To describe methods so others can replicate
- Allows feedback (improves work)
- Promotes career
  - document productivity
  - document impact on field/reputation
  - Advertises your lab for future trainees
- Improves chances of funding



# types of scientific publications

- Original research
- Review article
  - Narrative review
  - Systematic review
  - Meta analysis
- Brief Reports/Clinical Reports
- Clinical trial
- Rapid Communication
- Letters to the Editor



# Essential Parts of a Scientific paper

**Title:** Describe concisely the core contents of the paper

**Abstract:** Summarize the major elements of the paper

**Introduction:** provide context and rationale for the study

**Materials:** Describe the experimental design so it is reproducible

**Methods:** Describe the experimental procedures

**Results:** Summarize the findings without interpretation

**Discussion:** Interpret the findings of the study

**Summary:** Summarize the findings

**Acknowledgement:** Give credit to those who helped you

**References:** List all scientific papers, books and websites that you cited



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# IMRAD Format

**I** = Introduction, what question (problem) was studied

**M** = Methods, how was the problem studied

**R** = Results, what are the findings

**A** = and

**D** = Discussion, what do these findings mean



# Steps in paper writing

## Before Starting to Write the Paper

- Record your readings (results)
- Make tables
- Draw graphs
- Keep file to record summaries of results and any observation however insignificant
- Date the files
- Revise your readings, you may need to repeat an experiment while you still have the materials.
- Write ideas when ever they come to you





# Steps in paper writing

## Making a start on writing

Begin with the easiest section ( M and M).

Results section

The most difficult section ( discussion)



# The Title

- ✓ A good title is defined as the fewest possible words that adequately describe the contents of the paper.
- ✓ The title is extremely important and must be chosen with great care as it will be read by thousands, whereas few will read the entire paper
- ✓ An improperly titled paper will get lost and will never be read.
- ✓ It should capture the fundamental nature of the experiments and findings



# How to Prepare the Title

- ✓ Make a list of the most important keywords
- ✓ Think of a title that contains these words
- ✓ The title could state the conclusion of the paper
- ✓ The title NEVER contains abbreviations, chemical formulas, proprietary names or jargon
- ✓ Think, and rethink of the title before submitting the paper
- ✓ Be very careful of grammatical errors



# ABSTRACTS

## Abstracts are used:

- for library services
- for scientific publications
- for speaker proposals at conferences
- for grant or scholarship applications in foreign institutions

## Abstract should reflect:

- Actuality
- Problem statement
- Ways of problem solution
- Used techniques and methods
- Conclusion (for whom it may be interesting)



# Abstract

An abstract is a shortened version of the paper and should contain all information necessary for the reader to determine:

- (1) what the objectives of the study were;
- (2) how the study was done;
- (3) what results were obtained;
- (4) and the significance of the results.

Frequently, readers of a scientific journal will only read the abstract, choosing to read at length those papers that are most interesting to them.

Although it appears as the first section in a paper, most scientists write the abstract section last.



# Structural abstract

## Abstract

**Background:** Quercetin is a flavonoid with the ability to improve the growth of embryos in vitro, and actinomycin D is an inducer of apoptosis in embryonic cells.

**Objective:** The aim was to evaluate the effect of quercetin on the number of viable and apoptotic cells, the zona pellucida (ZP) thickness and the hatching rate of preimplantation embryos exposed to actinomycin D in mice.

**Materials and Methods:** Two-cell embryos were randomly divided into four groups (Control, Quercetin, actinomycin D, and Quercetin + actinomycin D group). Blastocysts percentage, hatched blastocysts, and ZP thickness of blastocysts was measured. The number of blastomeres was counted by Hoechst and propidium iodide staining and the apoptotic cells number was counted by TUNEL assay.

**Results:** The results showed that the use of quercetin significantly improved the growth of embryos compared to the control group ( $p=0.037$ ). Moreover, quercetin reduced the destructive effects of actinomycin D on the growth of embryos significantly ( $p=0.026$ ).

**Conclusion:** quercetin may protect the embryos against actinomycin D so that increases the number of viable cells and decreases the number of apoptotic cells, which can help the expansion of the blastocysts, thinning of the ZP thickness and increasing the hatching rate in mouse embryos.

**Key words:** *Quercetin, Embryonic development, Zona pellucida, Apoptosis, Blastocyst inner cell mass.*



# Unstructured abstract

A single paragraph that briefly summarises each main section of your paper.

## Abstract

Glioblastoma multiforme (GBM) is a common, aggressive, fast-growing tumor of the central nervous system that currently has no effective treatment. Although stem cell therapy has shown promising in vitro achievements, the blood-brain barrier (BBB) has always been a major hurdle to clinical success. To overcome this challenge, exosomes have been targeted as attractive drug delivery agents in numerous studies since they are small enough to enter the BBB. Furthermore, exosomes' characteristics and compositions are directly determined by the parent cell and these heritable traits affect their cell interactions. This article focuses on exosomes as an alternative to stem cell therapy to regulate glioma cell activity. Exosomes were isolated from rat bone marrow mesenchymal stem cells (rBMMSCs) by ultracentrifugation method and then characterized via western blot, dynamic light scattering, scanning, and transmission electron microscopy. Next, various concentrations of the exosomes were incubated with C6 cells and their effects at different time points were evaluated in vitro. 3-(4,5-Dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide and Annexin/Pi assay results confirmed that the isolated exosomes cause cell death mostly through apoptosis, and a linear correlation was observed between exosomes' concentration and their cytotoxicity. Following that, the scratch test, colony formation test, and Transwell assay confirmed exosomes' significant impact on the migration and invasion behavior of C6 cells. For the first time, rBMMSC-derived exosomes have been used as a single treatment for GBM rather than in combination with other treatments or as a pharmaceutical carrier.

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## KEYWORDS

cancer, central nervous system, exosomes, glioblastoma multiforme, mesenchymal stem cells

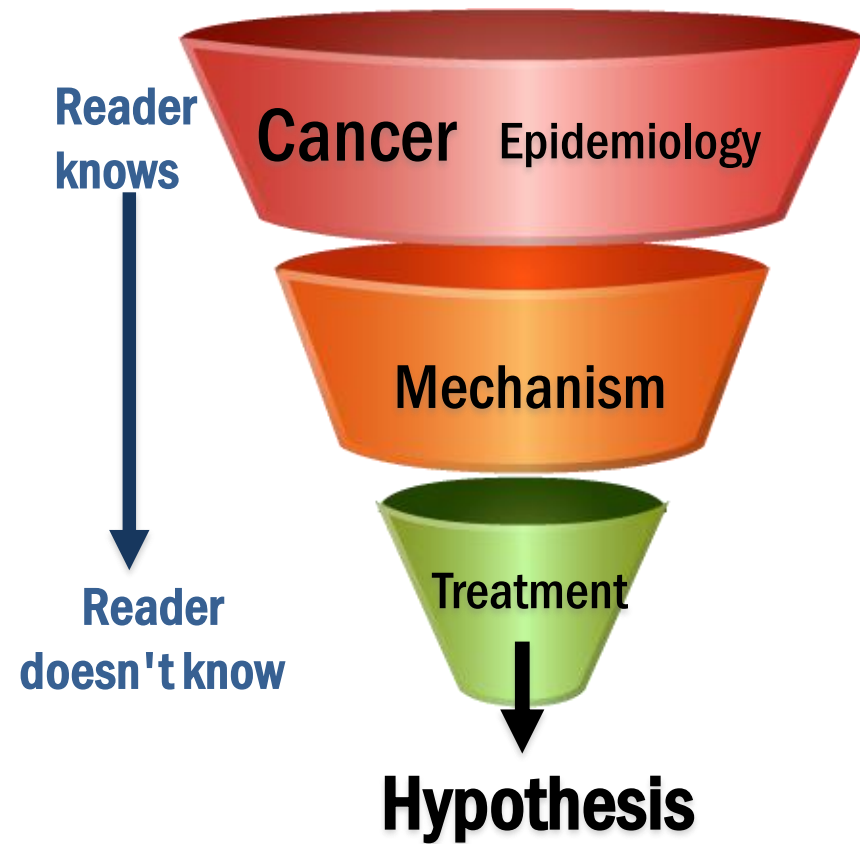


# Introduction

Why is this study of scientific interest and what is your objective?

This section discusses the results and conclusions of previously published studies, to help explain why the current study is of scientific interest.

The Introduction is organized to move from general information to specific information.



The last sentences of the introduction should be a statement of objectives and a statement of hypotheses. This will be a good transition to the next section, Methods, in which you will explain how you proceeded to meet your objectives and test your hypotheses.

# Introduction

- ❑ Poor experimentation cannot be masked by brilliant writing;  
however, poor writing can mask brilliant experimentation
- ✓ Avoid **complex sentence** structure
- ✓ Use simple and clear English
- ✓ Always keep in mind that the **paragraph** is the essential unit of thought.



# Expressing the importance of the topic

X is a **major area of interest** within the field of Y

The design of chimeric proteins is a major area of interest in structural biology and biotechnology.

X is an **increasingly important area** in Y

X has a **pivotal role** in Y

X is **fundamental** to...

X is an **important aspect** of...

X plays a **vital role** in the...

Microcirculation plays a vital role in the development of multiple organ failure in severe sepsis.

# Expressing the importance of the topic

X is a common condition which has **considerable impact** on ....

Childhood chronic health conditions have considerable impact on children.

**Recently**, researchers have shown an increased interest in ...

One of the **main obstacles** ....

One of the main obstacles towards this goal is the lack of simple model organisms suitable for these purposes.

One of the **greatest challenges** ....

X is a **leading cause** of ....

Myocardial infarction is a leading cause of death worldwide.

# Expressing the importance of the topic

The **main disadvantage** of X is that...

The main disadvantage of the **mentioned technique** is **its dependency on the number of decision variables**.

Exposure to X has been shown to be related to **adverse effects** in ...

X is associated with **increased risk** of ....

**Arsenic exposure** is associated with increased risk of **anemia**.

X is a growing **public health concern** worldwide.

X is a **common** disorder characterized by....

# Summarizing evidence

Pervious studies have reported...

Results from earlier studies demonstrate a strong and consistent association between...

Existing research recognizes the critical role played by....

Recent evidence suggests that...

Contrary to previously published studies, parsaei et al. demonstrated the efficacy of....

Previously published studies on the effect of X are not consistent ...

Taken together, these studies support the notion that...

# Deficiency or weakness

In addition, **no research has been found** that surveyed...

To date, **few studies** have examined the associating between...

Data about the efficacy and safety of X are **limited**.

Recent studies **have not able** to **detect** an increase in the risk of...

Howere, what is **not yet clear** is the role of...



# Statement of purpose and solution

An **objective** of this study was to investigate....

This study systematically **reviews** the data for...,**aiming** to provide...

This study **set out to** investigate the usefulness of...

# Methodology

- Section used to JUDGE the validity of results and conclusions
- This section of your proposal has multiple parts
  - Instrumentation
  - Study groups and ethics
  - Access to samples
  - Data analysis
- Justify your method choice
- Show you understand the principles
- **Prove feasibility of your study**



# Type of study

Qualitative/Quantitative

Retrospective / Prospective

Observational/Interventional

This **prospective study** set out to investigate the use of...

A **case-study** approach was used **to help understand** how...

# Sitting test

This study was conducted in a hospital/research center

## Sampling and grouping

A random sample of patients participated in the study from 2010 to 2020

77 male Wistar rats (weight250) were randomly divided into 7 groups.

## Inclusion/Exclusion criteria

The criteria for entering the study were:

# Ethics

**Ethical approval** was obtained from Semnan University of Medical Sciences.

## Statistic analysis

SPSS 2022 was used for statistical analysis of the samples.

## Statistical test

One-way ANOVA test was used to compare between groups

## The significance level

The significance level of  $p$  value was considered to be 5.%

# Results

- Description of samples
- The number of people who participated until the end.
- Time
- Shape
- Table
- Mean and standard deviation



# Discussion

- Restatement to aims
- Emphasis on key results
- Comparison with other studies
- Description of the causes of the results
- Author's comments
- Weaknesses and strengths
- Use and application of results
- Suggestion for future studies





# Restatement to aims

This study **set out to** ...

# Emphasis on key results

The present study showed that

# Comparison with other studies

These findings were **consistent** with the study of Parsai et al.

In **contrast** to previous findings

# Description of the causes of the results

A **possible explanation** for these findings

# Weaknesses and strengths

A **limitation of** this study is that

The **key strengths** of this study are its long duration and ..

**Authors contribution**

**Conflict of interest**

**Acknowledgment**

**All funding sources supporting the work and all institutional or corporate affiliations of the authors must be Acknowledged.**



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# Good Writing

- ☐ Content accuracy
- ☐ Clarity
- ☐ Precision
- ☐ Logic
- ☐ Well spelled/good “science” grammar



# Good Writing: Precise/Clear

The effects of antioxidant on autonomic function were increased by stress.

- ☐ Which antioxidant ?
- ☐ Which effects/mechanism?
- ☐ Which organism?
- ☐ Which dose?
- ☐ Which function?
- ☐ Measured when?
- ☐ Which stress?
- ☐ How much increase?



# Good Writing: Logic

- ❑ Experiments follow each other logically
- ❑ Topics introduced start out more general, then become specific
- ❑ Each paragraph has an overall purpose or topic
- ❑ Each sentence in the paragraph must be presented in a logical order



# Good Writing: Simplify

a majority of = most

at the present time = now

give rise to = cause

in some cases = sometimes

is defined as = is

it is believed that = I think

on the basis of = by

pooled together = pooled

subsequent to = after

with the result that = so that

Choose the simplest way of saying something:

**Familiar word, simple word.**



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# Good Writing: Simplify

“The genes were seen to be expressed.... (not good)

versus

“The genes were expressed....” (good)

**Original:** Elevation of intracellular ATP was observed following administration of compound Q.

**Succinct:** Intracellular ATP was elevated following administration of compound Q.

**Or:** Compound Q elevated intracellular ATP upon administration.





A photograph of a path covered in a thick layer of pink cherry blossom petals. Several trees with pink blossoms line the path, and a bright light source is visible in the distance, creating a soft glow. The text "Thanks for your attention" is overlaid in the center in a blue, sans-serif font.

Thanks for your attention