Chapter III – Scientific Publications Reviewing

Analysis and exploitation of scientific papers

III.1. Introduction

Scientists use multiple channels to share their information with their peers or with an informed public. Scientific publication is the major channel of scientific knowledge communication; it is considered the culmination of successful scientific research. The scientific articles are considered as the summit of the scientific publication, they are the main source of relevant information in the field of scientific research. Scientific publications are submitted to the test of scientific validation, with reading committees (reviewers), and to the strict observance of the scientific method in sciences and applied sciences (observation, experimentation, and reasoning). The preferred vehicle for communicating research results is the scientific article in an international peer-reviewed journal.

III.2. Scientific Journals

III.2.1. Definition

In academic publishing, a *scientific journal* is a periodical publication intended to further the progress of science, usually by reporting new scientific research results. These periodical publications appear at regular intervals (monthly, quarterly, annually …etc.). Scientific articles are the forming units of scientific Journals, and they are a permanent source of information on scientific news.

Scientific journals represent the most vital means for disseminating research findings and are usually specialized for different academic disciplines or sub-disciplines. Often, the research challenges common assumptions and/or the research data presented in the published scientific literature in order to gain a clearer understanding of the facts and findings. Depending upon the policies of a given journal, articles may include reports of original research, re-analyses of others' research, reviews of the literature in a specific area, proposals of new but untested theories, or opinion pieces.

Examples:

Science : published since 1880 till today.

Nature : published since 1896 till today.

III.2.2. Bibliographic parameters of scientific journals

Scientific journals are characterized with some parameters that allow the verification of the authenticity and relevance of these journals.

a. Title (name)

The title of the scientific journal (the name of the journal) is the first mean that allows its identification; it reflects the specialization and the field of interest of the journal. The title of the scientific journal also makes it easier to find and refer to articles, in particular that most of these titles are conventionally abbreviated when they are referenced.

b. ISSN

Scientific journals are identified by a unique number, the ISSN (International Standard Serial Number) pour printed journals, or the eISSN for electronic journals (published only on web).

The International Standard Serial Number (website: *http://www.issn.org/*) is an internationally accepted code which identifies the title of serial publications. It is an eight digit number consisting of seven numbers plus a check digit which enables a computer to recognize when the number is incorrectly cited.

Examples:

Nature : ISSN 1476-4687

Science : ISSN 1095-9203

c. Issues and Volume

An **Issue** of a scientific journal is one edition of this journal, while the **Volume** is a series of Issues of the same journal. There is generally one volume per year; however the number of volumes per year depends on the publishing periodicity of the journal. For example, a monthly journal (one issue per month) will have 12 issues, while a quarterly (one issue is published every 3 months) will have 4.

Table I. Example of some scientific journals, their abbreviations and fields.

Journal	Abbreviation	ISSN	Periodicity	Fields of interest
Nature	*Nature*	Online : 1476-4687 Print : 0028-0836	Weekly	All life and Nature fields
Journal of Hepatology	*J hepatol*	0168-8278	Monthly	Liver diseases
Journal of Cell Biology	*J Cell Biol*	0021-9525	Monthly	Basic cell biology as well as applied cellular advances

d. Editorial board

The editorial board (sometimes known as an advisory board) consists of a group of prominent people in the journal's field. Having an editorial board is very important; they act as ambassadors for journals. To some extent the quality of a journal is judged by the members and academic credentials of its editorial board.

Editorial board members are peers whose judgment is highly regarded within the journal's main discipline; or their decisions may not be regarded as valid.

Editorial board functions may include:

- Identifying new topics for commissions, special editions and advising on direction for the journal, and giving feedback on past issues and making suggestions for both subject matter and potential authors
- Provide content by writing occasional editorials and other short articles
- Approaching potential contributors
- Peer review; also help to identify peer reviewers and provide second opinions on papers (i.e. where there is a conflict between reviewers)
- Identify appropriate conferences for editors to attend
- Endorse the journal to authors, readers and subscribers and encourage colleagues to submit their best work.

The **Editor**, sometimes called **Editor-in-Chief**, is the most senior editor who has overall responsibility for the journal; he is responsible for broad oversight of the journal, including performance of the editorial board. Journal editors also evaluate all manuscripts that are submitted to their journal, select those which they consider to be suitable for the journal to send for peer review, and consider peer reviewers' advice to make a final decision about what gets published. Therefore, it is important to know how they make their decisions.

Sometimes the "Editor" may also refers to **Publisher,** who is the person or the institution (university, company, organization, association, …etc) who owns or publishes the journal.

III.2.3. Bibliometrics and scientific journals evaluation

The authenticity and credibility of scientific journals is highly considered by all the scientific community. Not all publications have the same notoriety or the same visibility, and this has repercussion on papers published in a given journal or review. Thus, an article published in a well-rated journal will normally carry more "weight" than an article published in a more confidential or less scientific journal.

Many tools have been created to classify, compare and measure the performance and notoriety of scientific journals. They also serve, ultimately, to classify institutions and evaluate researchers. These

tools and measurements are known as "Bibliometrics", sometimes referred as "scientometrics". The term 'bibliometrics' was first introduced in 1969 as a substitute for statistical bibliography used up until that time to describe the field of study concerned with the application of mathematical models and statistics to research, and quantify the process of written communication. Evaluative bibliometrics is a term coined in the seventies to denote the use of bibliometric techniques, especially publication and citation analysis, in the assessment of scientific activity.

The evaluation is based on statistical analysis of data related to the publications of journals (number of publications, number of citations, publication history ...etc.) to build a set of indicators that help to define and evaluate journals quality.

III.2.3.1. Bibliometrics indicators

a. Indexation: it consists in listing (repertorying) the journal in one of the reliable databases dedicated to the evaluation of scientific journals. If the journal is listed in one of these databases, it is called "Indexed". The most trustworthy Indexation databases are:

- Thomson-Reuters® (http://ip-science.thomsonreuters.com/mjl/) (actually called "Clarivate Analytics) that is developed by Web of Science (WoS) database. Thomson-Reuters® indexation is annually reviewed in Journal Citation Report (JCR) for ranking peer-reviewed journls.

- Scopus® (https://www.scopus.com/home.uri) which is one of largest abstract and citation database of peer-reviewed literature: scientific journals, books and conference proceedings. Scopus features smart tools to track, analyze and visualize research. Scopus® Indexation is based on CiteScore™ metrics used to evaluate journals.

Besides Thomson-Reuters® and Scopus®, many other indexation databases are available, such as: Index Medicus/PubMed/MedLine®, EMBASE®, EBSCO® Publishing's …etc.

Indexation of a journal is considered a reflection of its quality. Indexed journals are considered to be of higher scientific quality as compared to non-indexed one's. To check the indexation of a journal, it suffices to enter its Title or its ISSN in the indexing database. It should be noted that some databases are chargeable (not free).

b. Ranking: It consists of a classification of scientific journals based on their impact in their specialty field. Journal ranking is widely used in academic circles in the evaluation of a scientific journal's impact and quality. Thus, Journal rankings are intended to reflect the place of a journal within its field, the relative difficulty of being published in that journal, and the prestige associated with it.

Currently, the most widely used metric to rank journals is Clarivate Analytics' "Impact Factor" (IF) (used by WoS database and reported in JCR), a measure based on citations of articles published in the given journal. Another indicator widely used is CiteScore (CS) which was launched in by Elsevier as an alternative to the generally used JCR impact factors (calculated by Clarivate®), it is based on the citations recorded in the Scopus database rather than in JCR.

SCImago Journal Rank (The SJR), which is developed by the SCImago Research Group at the University of Extremadura in Spain, is a highly considered metric in journals ranking. The SJR uses a page-rank algorithm to determine which widely considered in journals ranking, citations are from more widely read journals, with these citations being given more weight. Even though, SJR relies on the Scopus database.

c. Citation impact: "Citation" refers to the use of an article as reference by other researchers, when author uses his own paper as reference then we talk about "Self-Citation". This indicator takes both the number of articles produced and the citation impact of these articles into account.

The citation impact of a journal is calculated by dividing the total number of citations by the total number of publications during a period of time (2 years, 3years, 5years …etc.). Citation impact shows the average number of citations that a document has received.

$$Citation\ Impact = \frac{\sum Citations}{\sum Publications}$$

Different Citation Impact metrics have been developed to evaluate the impact of journals:

☞ ***Impact Factor (IF):*** The Journal Impact Factor (IF or JIF) is defined as all citations to the articles of a journal in the current JCR year to items published in the previous two years, divided by the total number of items publication in the journal in the previous two years.

$$\boldsymbol{Impact\ Factor_{2021}} = \frac{\sum Citations_{2019} + \sum Citations_{2020}}{\sum Publications_{2019} + \sum Citations_{2020}}$$

Recently, a variant of ***IF*** have been introduced as a supplemental metric to evaluate scientific journals; the *5-years Impact Factor*. Its calculation is factored in the same manner as the Journal Impact Factor, but considers a five-year window of citation data. It evaluates the average number of times articles from the journal published in the past five years have been cited in the JCR year. It is calculated by dividing the number of citations in the JCR year by the total number of articles published in the five previous years.

☞ ***CiteScore:*** It is a measure reflecting the yearly average number of citations to recent articles published in a journal. CiteScore is based on the citations recorded in the Scopus database rather than in JCR, and those citations are collected for articles published in the preceding 4 years instead of 2 or 5 (for IF). CiteScore metrics calculate the citations from all documents in year one to all documents published in the prior three years for a title. This offers a more robust and accurate indication of a journal's impact. As an example, to calculate a 2021 value, CiteScore counts the citations received in 2021 to documents published in 2020, 2019, 2018 and 2017. This number is divided by the number of documents indexed on Scopus published in 2020, 2019, 2018 and 20172017.

$$CiteScore_{2021} = \frac{\sum Citations_{2017} + \sum Citations_{2018} + \sum Citations_{2019} + \sum Citations_{2020}}{\sum Publications_{2017} + \sum Publications_{2018} + \sum Publications_{2019} + \sum Citations_{2020}}$$

☞ ***h-Index:*** The h-index (also known as Hirsch-Index) is defined as the maximum value of '*h*' such that the given author/journal has published at least '*h*' papers that have each been cited at least '*h*' times. The index is designed to improve upon simpler measures such as the total number of citations or publications. The *h*-index can be applied to any level of aggregation (author, institution, journal, etc.) and it can reveal information about how the citations are distributed over a set of documents.

Another metric indicator derived from *h*-index is ***h5*-index**, which is the h-index for articles published in the last 5 complete years. It is the largest number '*h*' that '*h*' articles published in last 5 years have at least been cited '*h*' times.

Beside these three most used Citation impact indicators, we find many others metrics indicators that aim to efficiently evaluate the impact of journals, such as *Eigenfactor*®, *Google Scholar Metrics* …etc.

Impact plays an important part in understanding the performance of a journal over time and making decisions about its future. It is impossible to get a true picture of impact using a single metric alone, so a basket of metrics is needed to support informed decisions.

d. Peer reviewing: it is a process in which other scientists (the professional peers of the authors) evaluate the quality and merit of research before recommending whether or not it should be published. The reason for this thorough evaluation by peers is that a scientific article is more than a snapshot of what is going on at a certain time in a scientist's research, but it is a part of scientific knowledge.

Peer-reviewing is an indicator of the seriousness and authenticity of a scientific journal. It can ensure a high reliability of published scientific data and thus reflects the quality of the scientific journal. Thus, all highly considered databases only index journals with serious and verified peer-reviewing.

This list of bibliometric parameters is not exhaustive; other significant metrics are also used in the evaluation of scientific journals. In addition, these indicators are not used individually, but rather grouped together for a better and more efficient evaluation of scientific journals.

Table II. Comparaison between IF and CiteScore metrics.

Parameter	IF	CiteScore
Evaluation period (years)	2	4
Database	JCR	Scopus
No. indexed journals (2016)	11,000	22,000
Access	Subscribers	Anyone
Evaluated items	Articles, reviews	All publications

III.3. Scientific Articles (Scientific Papers)

III.3.1. Definition

A scientific article (also called "scientific paper") is a manuscript that represents an original work of scientific research or study. It can be an addition to the ongoing study in a field; can be innovative, or a comparative study between different approaches. Scientific paper can also support a hypothesis with original research, describe existing research or comment on current trends in a specific field. Thus, types of scientific research include: Original Research, Descriptive, Analytic, Methods Papers, Meta-analysis, Commentary …etc.

III.3.2. Characteristics of Scientific articles

Scientific papers are a special type of written work that have particular characteristics:

- Standardized style of writing and data presentation.

- Usually published in a periodical journal, or occasionally compiled in book form.

- Peer reviewed which means that the paper has been subjected to the scrutiny of several experts in the field who verify the quality of the writing and the accuracy of the analysis and conclusions drawn by the authors.

- Citable, which means that the content is stable, the journal is readily available in libraries and (usually) through the Web, and there are standardized methods of identifying a particular article? Thus, an author can refer to a paper with confidence that a reader can easily look up that reference at any point in the future.

- Include citations, which means that the paper frequently makes reference to previous publications that are relevant to the work being discussed. All cited works are listed in a reference section at the end of the paper. Footnotes at the bottom of each pager are not used to make citations.

III.3.3. Types of Scientific Articles

There are numerous types of articles to be found in scientific journals, all of which contribute to the individual journal's scope. Information on the format, style, and purpose of each type of article are usually detailed in a journal's instructions to authors or author guidelines.

III.3.3.1. Primary articles (Original)

Primary articles communicate knowledge arrived at or discovered by the author(s). They include theoretical articles, which present new or established abstract principles (e.g. mathematical modeling of biological and physiological processes), as well as observational and experimental research.

The research articles are the most important type of scientific papers; they provide unique information based on an original-research design. They are usually detailed studies that report original conducted research. The articles can be descriptive or analytical in nature, and report on studies that are retrospective (examining past outcomes) or prospective (looking for new outcomes). Generally, these academic articles will include a hypothesis, the context, methods, results and an interpretation or discussion of those results.

These articles are typically long, ranging anywhere from 3,000 to 8,000 words and may extend to 12,000 words for some journals. The format of the body of a research article usually follows the **IMRAD** structure (for **I**ntroduction - **M**aterial and Methods- **R**esults **A**nd **D**iscussion). A structured abstract usually precedes the article. Examples include randomized controlled clinical trials, before-and-after studies, cohort studies, case-control studies, cross-sectional surveys, and diagnostic test assessments.

Primary (research) articles can take different forms depending on the data and the knowledge communicated in within:

a. Research article (experimental)

The most important type of paper, it provides new information based on original research. This category of paper is usually prospective and is supported by in-depth statistical analysis. The conclusions should be supported by the data provided in the results. Thus, original research article is a detailed account of research activity written by the scientists who did the research (not by someone else who is reporting on the research). Some instructors may refer to these as "scientific research" articles or as "empirical" research.

b. Clinical articles

In medicine and other types of clinical practice, like clinical psychology, clinical case studies are common. These publications describe details of real cases that involve patients and are typically chosen

for publication because they contribute something to existing knowledge in the field. This type of paper can include a discussion of symptoms, diagnosis and treatment of a disease or disorder. Clinical trial papers are also typical in the field of medicine and describe methods and results of controlled studies usually undertaken with large patient groups that have been randomly assigned to treatment and control groups.

Clinical articles are typically similar in length and format to original research articles.

c. Case-reports:

A case report (sometimes called a clinical case study) describes a single study, documenting unique features discovered during the research process. Notable features can include previously unreported observations of a known disease; the unique use of imaging or diagnostic testing to reveal a disease; or an undocumented clinical condition, treatment, or complication. Case reports are usually short and focused with a limited number of figures and references. Their format generally includes a short abstract (or none at all), a brief introduction, an account of the case study, and a discussion giving context to the research findings. If relevant, a limited review of the literature might be included in a case report.

III.3.3.2. Secondary articles or Synthesis Articles

Secondary or synthesis articles expand on knowledge that has been previously communicated by others. That includes revisiting, reviewing, analyzing, or synthesizing existing research, and presenting it in a new light. Secondary articles might come in the form of a monograph (a detailed study of a single subject or aspect of a subject), a descriptive review, or commentary.

a. Review Articles (Literature Reviews): presents the current knowledge including substantive findings as well as theoretical and methodological contributions to a particular topic.

b. Systematic reviews: identifies, appraises and synthesizes all the empirical evidence that meets pre-specified eligibility criteria to answer a specific research question. Researchers conducting systematic reviews use explicit, systematic methods that are selected with a view aimed at minimizing bias, to produce more reliable findings to inform decision making.

c. Meta-analysis: a quantitative, formal, epidemiological study design used to systematically assess the results of previous research to derive conclusions about that body of research. Typically, but not necessarily, a meta-analysis study is based on randomized, controlled clinical trials.

III.3.3.3. Specific Articles

This includes some scientific writing that are specific in their forms and contents; such as Editorial, Commentary, Letter to Editor, Short-Notes, Short-Communications …etc.

III.3.3. Structure of Scientific articles

The structure of a scientific mainly depends on its type: original or Review article. However, all scientific papers of a given type (original or Review) have the same general format. The structure of scientific paper is divided into distinct sections and each section contains a specific type of information. Some sections are common for both original and review articles, while other sections are specific for each type. The number and the headings of sections may vary among journals, but for the most part a basic structure is maintained.

III.3.3.1. Common Sections of Scientific articles

***- Title*:**

The title is the part of a paper that is read the most; it is usually read first and most often. Electronic indexing services rely heavily on the accuracy of the title to allow users to find papers that are relevant to their research. A good title must contain the fewest possible words that adequately describe the contents of the paper; while an effective titles must identify the main issue of the paper, begin with the subject of the paper, be accurate, unambiguous, specific and complete; it must not contain abbreviations unless they are well known by the target audience and finally attract readers.

- Authorship:

Authorship designates the list of authors who participated in the development, writing and editing of the article. Usually, Authors are listed according to their respective contributions to the work, with the team leader or director generally mentioned last. In the list of authors, we can identify the main author (first mentioned) and his co-authors, as well as the author of correspondence to whom all correspondence should be addressed. The list of authors is often followed by the affiliation of each author (institution and working address); otherwise it must be mentioned elsewhere.

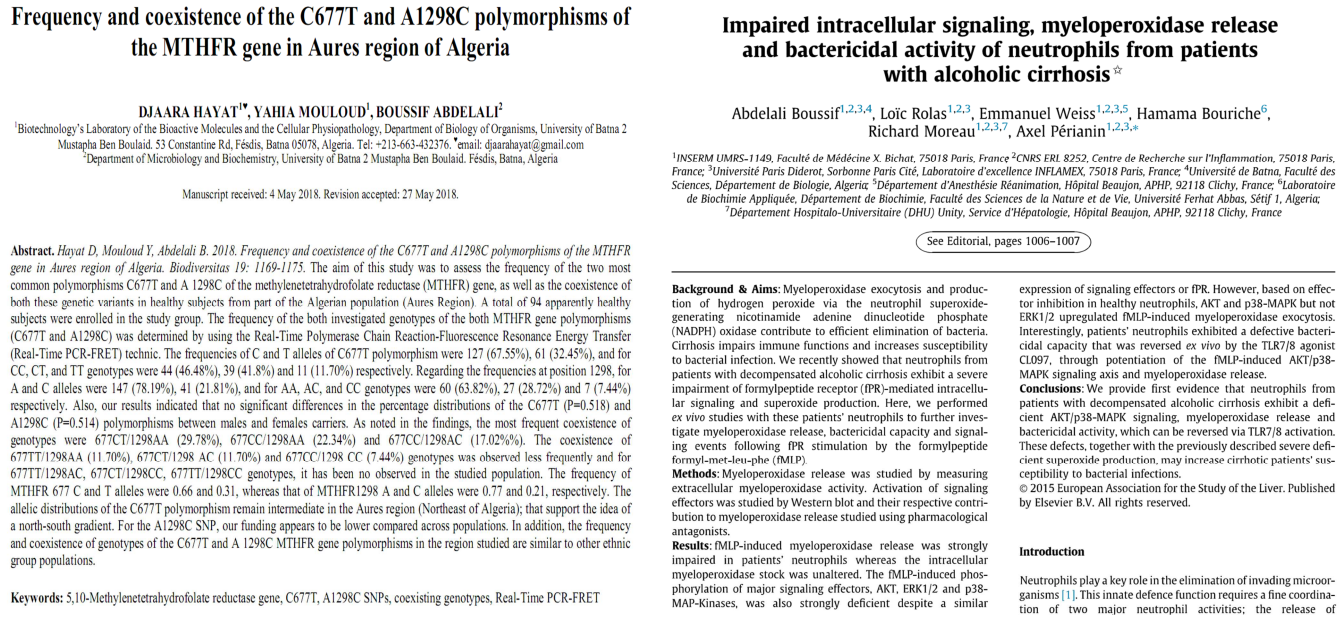
The list of authors partly facilitates the *citation* of the article when used as a reference in scientific work.

- Abstract:

An abstract contains brief statements of the purpose, methods, results, and conclusions of a study. Abstracts are often included in article databases, and are usually free to a large audience. Thus, they may be the most widely read portions of scientific papers.

Structurally, the abstracts are divided into structured and unstructured types. The unstructured abstracts (traditional) are written in a paragraph and they don't have any title specific for different parts of an abstract. It is required that the content, order and sequence of the items in an unstructured abstract are

formulated as it is in the structured one. In the structured abstracts, these sections are mentioned separately: Aim (Objective), Methods (Design), Results and Conclusion.



Frequency and coexistence of the C677T and A1298C polymorphisms of the MTHFR gene in Aures region of Algeria

DJAARA HAYAT[1*], YAHIA MOULOUD[1], BOUSSIF ABDELALI[2]
[1]Biotechnology's Laboratory of the Bioactive Molecules and the Cellular Physiopathology, Department of Biology of Organisms, University of Batna 2 Mustapha Ben Boulaid. 53 Constantine Rd, Fésdis, Batna 05078, Algeria. Tel: +213-663-432376. *email: djaarahayat@gmail.com
[2]Department of Microbiology and Biochemistry, University of Batna 2 Mustapha Ben Boulaid. Fésdis, Batna, Algeria

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Abstract. *Hayat D, Mouloud Y, Abdelali B. 2018. Frequency and coexistence of the C677T and A1298C polymorphisms of the MTHFR gene in Aures region of Algeria. Biodiversitas 19: 1169-1175.* The aim of this study was to assess the frequency of the two most common polymorphisms C677T and A 1298C of the methylenetetrahydrofolate reductase (MTHFR) gene, as well as the coexistence of both these genetic variants in healthy subjects from part of the Algerian population (Aures Region). A total of 94 apparently healthy subjects were enrolled in the study group. The frequency of the both investigated genotypes of the both MTHFR gene polymorphisms (C677T and A1298C) was determined by using the Real-Time Polymerase Chain Reaction-Fluorescence Resonance Energy Transfer (Real-Time PCR-FRET) technic. The frequencies of C and T alleles of C677T polymorphism were 127 (67.55%), 61 (32.45%), and for CC, CT, and TT genotypes were 44 (46.48%), 39 (41.8%) and 11 (11.70%) respectively. Regarding the frequencies at position 1298, for A and C alleles were 147 (78.19%), 41 (21.81%), and for AA, AC, and CC genotypes were 60 (63.82%), 27 (28.72%) and 7 (7.44%) respectively. Also, our results indicated that no significant differences in the percentage distributions of the C677T (P=0.518) and A1298C (P=0.514) polymorphisms between males and females carriers. As noted in the findings, the most frequent coexistence of genotypes were 677CT/1298AA (29.78%), 677CC/1298AA (22.34%) and 677CC/1298AC (17.02%%). The coexistence of 677TT/1298AA (11.70%), 677CT/1298 AC (11.70%) and 677CC/1298 CC (7.44%) genotypes was observed less frequently and for 677TT/1298AC, 677CT/1298CC, 677TT/1298CC genotypes, it has been no observed in the studied population. The frequency of MTHFR 677 C and T alleles were 0.66 and 0.31, whereas that of MTHFR1298 A and C alleles were 0.77 and 0.21, respectively. The allelic distributions of the C677T polymorphism remain intermediate in the Aures region (Northeast of Algeria); that support the idea of a north-south gradient. For the A1298C SNP, our funding appears to be lower compared across populations. In addition, the frequency and coexistence of genotypes of the C677T and A 1298C MTHFR gene polymorphisms in the region studied are similar to other ethnic group populations.

Keywords: 5,10-Methylenetetrahydrofolate reductase gene, C677T, A1298C SNPs, coexisting genotypes, Real-Time PCR-FRET

Impaired intracellular signaling, myeloperoxidase release and bactericidal activity of neutrophils from patients with alcoholic cirrhosis ☆

Abdelali Boussif[1,2,3,4], Loïc Rolas[1,2,3], Emmanuel Weiss[1,2,3,5], Hamama Bouriche[6], Richard Moreau[1,2,3,7], Axel Périanin[1,2,3,*]

[1]*INSERM UMRS-1149, Faculté de Médécine X. Bichat, 75018 Paris, France* [2]*CNRS ERL 8252, Centre de Recherche sur l'Inflammation, 75018 Paris, France;* [3]*Université Paris Diderot, Sorbonne Paris Cité, Laboratoire d'excellence INFLAMEX, 75018 Paris, France;* [4]*Université de Batna, Faculté des Sciences, Département de Biologie, Algeria;* [5]*Département d'Anesthésie Réanimation, Hôpital Beaujon, APHP, 92118 Clichy, France;* [6]*Laboratoire de Biochimie Appliquée, Département de Biochimie, Faculté des Sciences de la Nature et de Vie, Université Ferhat Abbas, Sétif 1, Algeria;* [7]*Département Hospitalo-Universitaire (DHU) Unity, Service d'Hépatologie, Hôpital Beaujon, APHP, 92118 Clichy, France*

See Editorial, pages 1006–1007

Background & Aims: Myeloperoxidase exocytosis and production of hydrogen peroxide via the neutrophil superoxide-generating nicotinamide adenine dinucleotide phosphate (NADPH) oxidase contribute to efficient elimination of bacteria. Cirrhosis impairs immune functions and increases susceptibility to bacterial infection. We recently showed that neutrophils from patients with decompensated alcoholic cirrhosis exhibit a severe impairment of formylpeptide receptor (fPR)-mediated intracellular signaling and superoxide production. Here, we performed *ex vivo* studies with these patients' neutrophils to further investigate myeloperoxidase release, bactericidal capacity and signaling events following fPR stimulation by the formylpeptide formyl-met-leu-phe (fMLP).
Methods: Myeloperoxidase release was studied by measuring extracellular myeloperoxidase activity. Activation of signaling effectors was studied by Western blot and their respective contribution to myeloperoxidase release studied using pharmacological antagonists.
Results: fMLP-induced myeloperoxidase release was strongly impaired in patients' neutrophils whereas the intracellular myeloperoxidase stock was unaltered. The fMLP-induced phosphorylation of major signaling effectors, AKT, ERK1/2 and p38-MAP-Kinases, was also strongly deficient despite a similar expression of signaling effectors or fPR. However, based on effector inhibition in healthy neutrophils, AKT and p38-MAPK but not ERK1/2 upregulated fMLP-induced myeloperoxidase exocytosis. Interestingly, patients' neutrophils exhibited a defective bactericidal capacity that was reversed *ex vivo* by the TLR7/8 agonist CL097, through potentiation of the fMLP-induced AKT/p38-MAPK signaling axis and myeloperoxidase release.
Conclusions: We provide first evidence that neutrophils from patients with decompensated alcoholic cirrhosis exhibit a deficient AKT/p38-MAPK signaling, myeloperoxidase release and bactericidal activity, which can be reversed via TLR7/8 activation. These defects, together with the previously described severe deficient superoxide production, may increase cirrhotic patients' susceptibility to bacterial infections.

Introduction

Neutrophils play a key role in the elimination of invading microorganisms [1]. This innate defence function requires a fine coordination of two major neutrophil activities; the release of

Figure 1. Example of unstructured (left)(Djaara et al. 2018) and structured abstract (right) (Boussif et al., 2016).

These sections are reported in the first page of the article, called "Title Page", with other information such as Journal information (title or abbreviation, volume, number, pages … etc), keywords, abbreviation used in the article, …etc.

***- References*:**

The References are crucial to a published article, they designate the scientific literature that has been cited throughout the article, and which is listed at the very end of the article generally by order of appearance in the article.

***- Acknowledgements**:*

This section is optional and used to express gratitude for every person or institution that provided any significant helps in carrying out the work, and any sources of funding that supported the research. Acknowledgments are always brief and never flowery, and reported at the end of article before "References" section.

III.3.3.2. General structure of original articles

Original articles (Research article) are published in the aim of presenting and discussing experimental results, these articles use the IMRAD (or IMRaD) structure format. IMRAD structure stands for Introduction-Methods-Results-and-Discussion, and it is the most prominent norm for the structure of the original research articles.

Typically, IMRAD structure comprises the following parts:

- Introduction

The introduction section presents background information a reader needs to understand the rest of the author's paper. It has two major objectives: (a) It provides a context for the study and (b) it specifies the particular aims of the reported study.

The Introduction advances from general to specific, first describing the broad **context** of the study, followed by the **research question** and the necessary **background** information. Then, it presents the **approach** that the authors have taken to **answer** the **research question**. Sometimes, a result summary is presented at the very end of the Introduction.

Introduction gives answers to the question of why this study is relevant and why it was conducted in the first place.

- Methods:

Methods section (which can have different names: "Materials & Methods", "Methodology", etc.) explains how the study was conducted, it contains all the **methodological details** concerning the study design, execution of the experiments, and analysis. The goal of this section is to enable other scientists to evaluate the adequacy of the used methods, it provides investigators with enough information that will help them either repeat crucial sections or elaborate and extend the study. Sometimes, this section is located at the end of the article.

- Results:

The results section contains the data collected during experimentation. The results section is the heart of a scientific paper. It also includes explanations of what the results mean. The results are not only described in text, but also presented in **figures and tables**.

- Discussion:

The discussion section allows the authors to interpret their data and how they connect them to others works. Authors often use the discussion to describe what their work suggests and how it relates to

other studies. The Discussion emphasizes the main results and places them in the context of previous research and ongoing scientific discourse, proceeding from specific to general. At the end, the authors typically provide some predictions derived from their work and/or an outlook on future studies. In this section, authors can anticipate and address any possible objections to their work. The discussion section is also a place where authors can suggest areas of improvement for future research. Discussion section helps readers understand the meaning of the results and their implications.

Discussion section is generally accompanied or followed by a brief conclusion, in which authors resume the important findings and implications of their work

Some articles also contain Supplementary Materials, also called "Supporting Information", which is an extra file that can be found online at the article site or accessed through a link in the main article. Supplementary Materials may include raw data, methodological details, equation derivations, and additional (peripheral/supporting) results in form of figures or tables.

However, not all journals use IMRaD structure in this strict order, some changes can be introduced by the journal (for example putting Material and Methods after Discussion), that is why authors must consult the "Author's Guidelines" of journals. The IMRaD format, for instance, may not apply to scientific journal pieces, such as editorials and perspectives. Nevertheless, IMRaD is a predominant framework for the structure of a scientific article of the original research type; including lab reports, social sciences, biomedical and engineering.

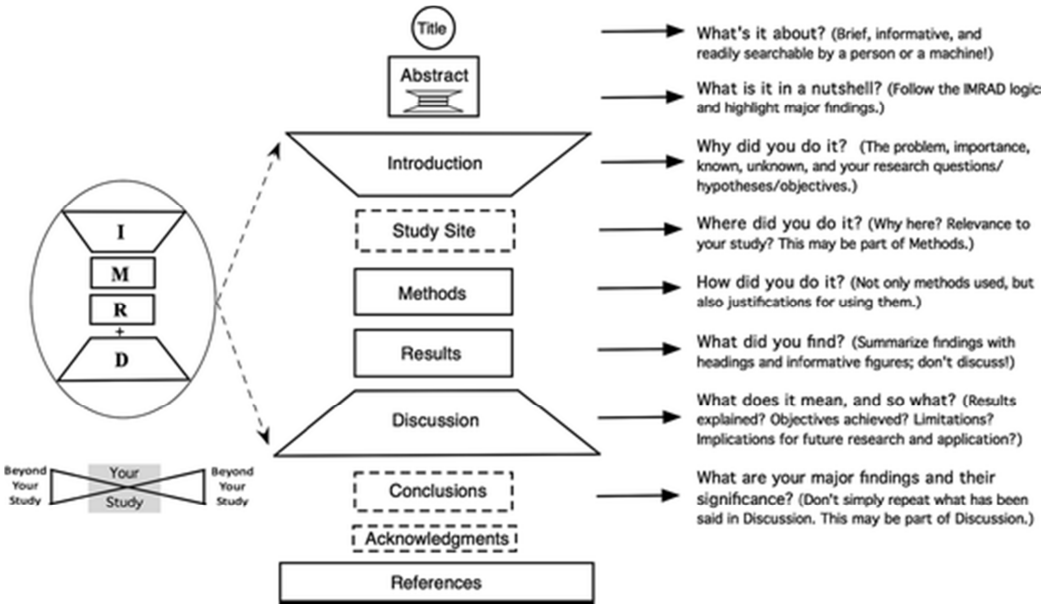

Figure 2. Diagrammatic representation of the IMRAD structure of research papers (Wu, 2011).

III.3.3.3. General structure of review articles

In contrast with research article, literature review aims to search and evaluate the available literature in given subject or chosen topic area. It documents the state of the art with respect to the subject or topic writing about. It summarizes literature, critically analyses information; and finally presents the literature in an organized way.

The general structure of review articles is adapted for their objectives, and it includes following sections:

- Introduction:

The introduction of review article provides information about the context, indicates the motivation for the review, defines the focus, the research question and explains the text structure. In the introduction subject background (general topic, issue, or area of concern) is given to illustrate the context, the problem is indicated, and the author's motivations (reason and justification for reviewing the literature, the approach and the organization of the text) are described.

- Body of article:

The body of article (or Main Body) is a coherent structuring of the topic that is necessary to develop the section structure. In this section, authors organize the literature according to common themes; provide insight into the relation between chosen topic and the wider subject area (e.g. between obesity in children and obesity in general); and move from a general, wider view of the literature being reviewed to the specific focus of research.

This section usually contains section with subheads; subheadings reflect the organization of the topic and indicate the content of the various sections.

- Conclusion

The conclusion section answers the research question set in the introduction. It shows implications of the findings, interpretations by the authors and the identification of unresolved questions. Thus, authors try to summarize the important aspects of the existing body of literature; evaluate the current state of the literature reviewed; identify significant flaws or gaps in existing knowledge; outline areas for future study; and link research to existing knowledge.

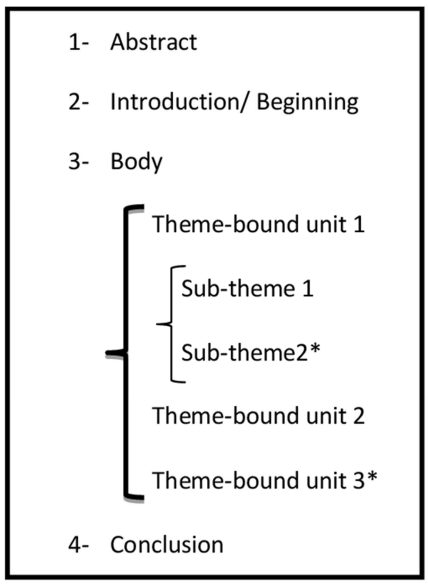

Figure 3. Simplified organisational structure of review articles (Azar and Hashim, 2017).