

UEL 340

Analyse d'articles scientifiques

2024-2025

POURQUOI ECRIT-ON UN ARTICLE ?

Revue sur un sujet
(état de l'art, vulgarisation)

Article scientifique spécifique

- Partager un résultat / une méthodologie → Evaluation par un comité de lecture
- Prendre date pour une découverte → Notion de copyright
- Toucher un grand nombre de lecteurs → Rédaction le plus souvent en anglais
- Se faire connaître (notion d'Impact Factor)

MÉTHODOLOGIE D'UNE ANALYSE D'UN ARTICLE SCIENTIFIQUE

• Structure de l'article

Titre journal et
références de
l'article

Titre article
Auteurs, laboratoires

Informations /dates

Mots-clés

Résumé

- Matériels et méthodes,
- Présentation / Discussion des résultats,
- Conclusion,
- Remerciements/source de financement,
- Références bibliographiques

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Review article

Interplay between biomaterials and the immune system: Challenges and opportunities in regenerative medicine

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ABSTRACT

The use of biomaterials for tissue engineering and regenerative medicine applications has increased dramatically over recent years. However, the clinical uptake of a wide variety of biomaterials remains limited due to adverse effects commonly exhibited by patients, which are caused by the host immune response. Despite this, current *in vitro* evaluation standards (ISO-10993) for assessing the host response to biomaterials have limitations in predicting the likelihood of *in vivo* biomaterial acceptance. Furthermore, endotoxin contamination of biomaterials is rarely considered, despite its ability to significantly affect the performance of biomaterials and engineered tissues. This review highlights the importance of the immune response to biomaterials and discusses existing challenges and opportunities in the development and standardised assessment of the immune response to biomaterials, including the importance of endotoxin levels. In addition, the properties of biomaterials that impact the host immune response and the exploitation of immunomodulatory biomaterials in regenerative medicine are explored. Finally, a standardised *in vitro* pathway of evaluating the immune response to biomaterials (hydrogels) and their regenerative potential is proposed, aiming to ensure safety and consistency, while reducing costs and the use of animals in the biomaterials research for tissue engineering and regenerative medicine.

Statement of significance

This review presents a critical analysis of the role of the interactions between the immune system and biomaterials in determining the therapeutic success of biomaterial-based approaches. No such review addressing the lack of understanding of biomaterial-immune system interactions during the developmental and pre-clinical stages of biomaterials, including the impact of the endotoxin levels of biomaterials on the immune response, is published. As there is a lack of *in vitro* regulations to evaluate the immune response to biomaterials, a standardised *in vitro* pathway to evaluate the immune response to biomaterials (hydrogels) and their immunomodulatory and regenerative potential for use in tissue engineering/regenerative medicine applications is presented. The aim of the proposed pathway of biomaterial evaluation is to ensure safety and consistency in the biomaterials research community, while reducing costs and animal use (through the concept of the 3R's - reduction, refinement, and replacement of animals).

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1. Introduction

Current tissue engineering and regenerative medicine strategies aim to restore the function of damaged tissues [1]. The current gold standard is autografting (utilising a patient's tissue to enhance healing), however, limitations such as the limited harvest of certain tissues as well as lengthy surgical time and donor site morbidity have warranted the search for alternative options [2]. The use of biomaterials for this purpose presents an attractive option, with the number of biomaterials being developed and studied increasing rapidly. Biomaterials play a major role in the estimated \$400bn worldwide medical device market, however, biomaterials are foreign bodies, thus adverse immune reactions to biomaterials pose a fundamental challenge that can drastically reduce the quality of life for patients, explaining their current poor clinical uptake [1,2]. These adverse reactions commonly disrupt the healing process, resulting in immense pain for the patient, excessive inflam-

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MÉTHODOLOGIE D'UNE ANALYSE D'UN ARTICLE SCIENTIFIQUE

- **Structure de l'article**
- Question principale /**problématique** de recherche
- **Méthodologie** utilisée
- Présentation des **résultats / discussion.**
- **Conclusion par rapport au cahier des charges des biomatériaux**

Ayez l'esprit critique !

SOUTENANCES par GROUPE : 30 novembre

UEL340 : Travail de groupe /articles scientifiques

GROUPE			ARTICLES
1	AALAOUI DOUCKAGA NISS LAURENT	RIAD BELTHASSA LIGHT ENZO	<ul style="list-style-type: none"> • 3D printable hyaluronic acid-based hydrogel for its potential application as a bioink in tissue engineering_Noh_2019. • Impression 3D en médecine régénératrice et ingénierie tissulaire_Fricain_2017
2	AGBOTA DUNAND LEGE	SEDAMI ANNA ALEXANDRE	<ul style="list-style-type: none"> • Regeneration of chronic tympanic membrane perforation using 3D collagen with topical umbilical cord serum _Jang_2013 • https://www.fondationpourl'audition.org/tympaanoplastie-542
3	ATTIA EMBUMBA BALINGI PARKARI	NOURHAN SYLVER LIANA	<ul style="list-style-type: none"> • Type I collagen hydrogels as a delivery matrix for royal jelly derived extracellular vesicles_Ramírez_2020 • Applications thérapeutiques des vésicules extracellulaires_Aubertin_2021
4	BEURIER GOULAMHOUSSEN SERRANO	LILLOU SANYA NATHY	<ul style="list-style-type: none"> • Design and characterization of a chitosan-enriched fibrin hydrogel for human dental pulp regeneration_Ducret_2019 • Revue biomatériaux régénération osseuse dentaire_Pagano_2024
5	BOMAL HABBAS TABRICH	LISA SARAH YASSIN	<ul style="list-style-type: none"> • Fabrication and biological properties of artificial tendon composite from medium chain length polyhydroxyalkanoate_Tawonsawatruk_2023 • Polymères synthétiques dégradables pour la conception de DMI_Garic_2017
6	CHABANE JUIF THAI	INÈS MATYSS EMILIE	<ul style="list-style-type: none"> • Tailoring nanostructure and bioactivity of 3D-printable hydrogels with self-assemble peptides amphiphile (PA) for promoting bile duct formation_Yan_2018 • Impression 3D en médecine régénératrice et ingénierie tissulaire_Fricain_2017
7	DONGMO KOUKOU WIZMAN	AXEL CAYODÉ ESTHER	<ul style="list-style-type: none"> • Silk Fibroin Films for Corneal Endothelial Regeneration Silk Fibroin films for corneal endothelial regeneration_Vazquez_2017 • Descemets Membrane Endothelial Keratoplasty-revue de la littérature_Kocaba_2018

Et bien sûr, vous pouvez consulter d'autres publications !

SOUTENANCES par GROUPE : 28 novembre

GROUPE		
1	AALAOUI DOUCKAGA NISS LAURENT	RIAD BELTHASSA LIGHT ENZO
2	AGBOTA DUNAND LEGE	SEDAMI ANNA ALEXANDRE
3	ATTIA EMBUMBA BALINGI PARKARI	NOURHAN SYLVER LIANA
4	BEURIER GOULAMHOUSSEN SERRANO	LILOU SANYA NATHY
5	BOMAL HABBAS TABRICH	LISA SARAH YASSIN
6	CHABANE JUIF THAI	INÈS MATYSS EMILIE
7	DONGMO KOUKOU WIZMAN	AXEL CAYODÉ ESTHER

- **10 min présentation + 10 min de questions**
- Présentation powerpoint (libre)
- A déposer sur Ecampus [le 27 novembre \(date limite\)](#)

- Chaque étudiant doit parler !
- La note de CC sera basée sur votre présentation + participation

- **IL VA FALLOIR ECHANGER DES INFORMATIONS DANS VOTRE GROUPE ET APPRENDRE A TRAVAILLER ENSEMBLE !**