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**Autovaccination with attenuated inflammatory cells ameliorates imiquimod induced psoriasis-like skin inflammation in mice**

Samar Salman, Mohamed L. Salem, Amany Abdel-Latif and  
Yasmina A. El Attar



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## **Welcome letter from Editor-in-Chief**



Welcome to the Int J Cancer and Biomedical Research (IJCBR)!

It is with great pleasure that I write this editorial to welcome you to the IJCBR. This journal provides a platform for publication of original and reviews research articles, short communications, letter to editor, thesis abstract, conference report, and case studies. These types of publication are directed at the interface of the fields of cancer and biomedical research.

The IJCBR relies on a distinguished expert of the Advisory and Editorial Board Members from the top international league covering in depth the related topics. They timely review all manuscripts and maintain highest standards of quality and scientific methodology and ethical concepts. Meanwhile, we take all possible means to keep the time of the publication process as short as possible.

I take this chance to welcome your contributions to the IJCBR and have every expectation that it will soon become one of the most respected journals in both the fields of cancer and biomedical research.

A handwritten signature in blue ink that reads "Mohamed L. Salem". The signature is written in a cursive, flowing style.

**Mohamed L. Salem,**

Editor in Chief

## Autovaccination with attenuated inflammatory cells ameliorates imiquimod induced psoriasis-like skin inflammation in mice

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### ABSTRACT

**Background:** Psoriasis is a complex immune-mediated inflammatory disease that occurs in a genetically susceptible individual. **Aim:** In this study, we aimed to test whether the use of autovaccine containing different attenuated inflammatory cells could ameliorate the inflammatory process in a psoriasis-like skin inflammation model. **Materials and Methods:** After six days of IMQ application, the psoriasis-like skin inflammation was developed. After six days of IMQ application, the psoriasis-like skin inflammation was developed. **Results:** After seven days of treatment (14 days of IMQ), the mice treated with the autovaccine showed the most significant improvement as reflected by PASI score. Treatment with autovaccine also induced the best significant decrease of the epidermal thickness as compared to the other treatments ( $P < 0.01$ ), where the complete disappearance of prurigo nodularis like skin lesions was observed. **Conclusion:** Taken our results together, it can be suggested that autovaccination by the attenuated inflammatory cells found in skin lesions of psoriasis-like inflammation can be a therapeutic modality for such kind of inflammatory reaction.

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### INTRODUCTION

Psoriasis is a complex immune-mediated inflammatory disease that occurs in genetically susceptible individuals (Ogawa et al. 2018). The role of the immune system in psoriasis has a significant impact on treatment development (Lowe et al., 2014). The use of attenuated autologous T cell vaccination has been evolved as a therapeutic modality for inflammatory and autoimmunity diseases (Huang et al. 2016; Huang et al., 2014). In this study, we aimed to test whether the use of autovaccine containing different attenuated inflammatory cells could ameliorate the inflammatory process in a psoriasis-like skin inflammation model.

The psoriasis-like model was induced as previously described (van der Fits et al. 2009). The dorsal skin of the mice ( $n=20$ ) was shaved and 5% Imiquimod "IMQ" cream (Aldara, 3M Pharmaceuticals) was topically applied at a dose of 62.50 mg for six consequent days. The animal

studies were carried out according to the institutional ethical committee guidelines. Animal investigations were carried out to a high ethical standard. All experimental procedures were approved by Research ethics guidelines by Tanta University.

### RESULTS

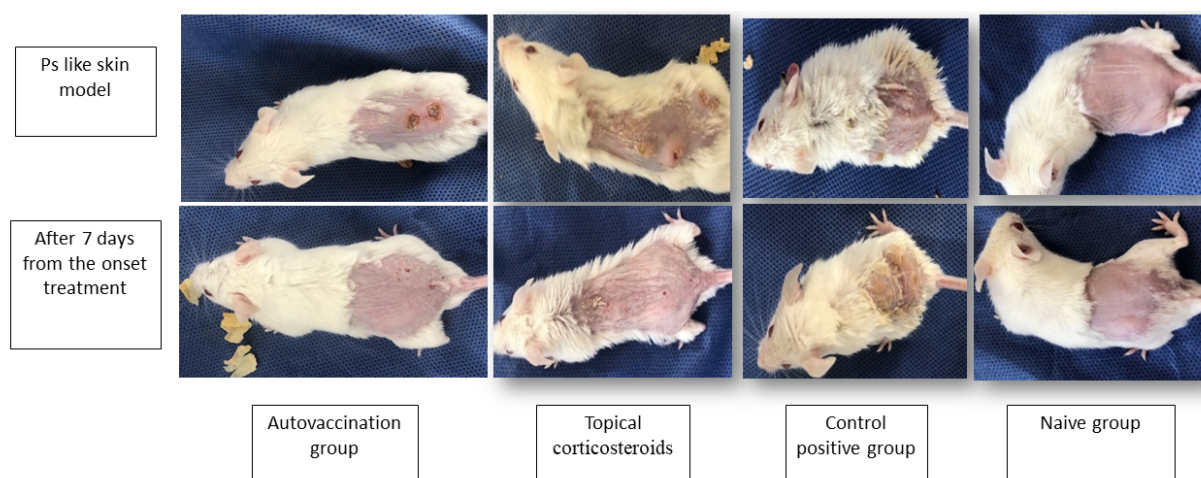
After six days of IMQ application, the psoriasis-like skin inflammation was developed. One mouse was sacrificed and a skin biopsy (2x2.5 cm) from the skin lesions was harvested under sterile conditions (Johnson 2012). The autovaccine was prepared by homogenizing the harvested biopsy by grinding them with a pestle and a mortar using liquid nitrogen. Under this setting, these attenuated inflammatory cells in the skin biopsy are considered as the autovaccine. On day 7 of IMQ treatment, the inflamed mice ( $n=6$ /group) were given an intralesional injection of 1 ml/mouse Phosphate-buffered saline, 1 ml/mouse

autovaccine (divided into multiple skin lesions), or treated with topical application of betamethasone cream (1 mg/mouse/day) (Mori et al. 2016). Clinical improvement was determined by the objective Psoriasis Area and Severity Index "PASI" score (the index included erythema, scales, and thickening). Each index was scored independently on a scale from 0 to 4, where 0: none, 1: slight, 2: moderate, 3: marked, 4: maximum. The mean difference of the epidermal thickness among the different groups was recorded. After 6 days of IMQ application and before treatment, we noticed prurigo nodularis like skin lesions that appeared in all groups as compared to naïve mice (Figure 1). After seven days of treatment (14 days of IMQ), the mice treated with the autovaccine showed the most significant improvement as reflected by PASI score as compared to treatment with PBS or the conventional drug (Figure 2). Treatment with autovaccine also induced the best significant decrease of the epidermal thickness as compared to the other treatments ( $p < 0.01$ ), where the complete disappearance of prurigo nodularis like skin lesions was observed. Treatment of inflamed mice with autovaccination ameliorated most of the IMQ-induced histopathological changes, including acanthosis, papillomatosis, parakeratosis, and infiltration of inflammatory cells in the dermis (Figure 2).

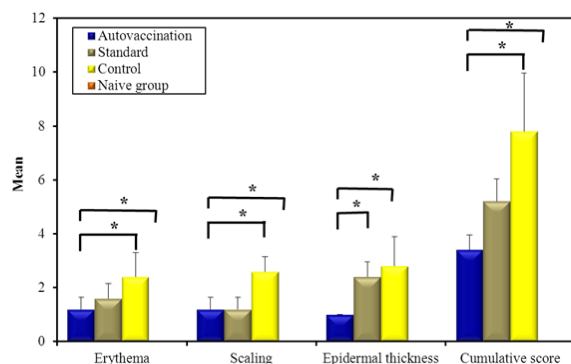
Taken our results together, it can be suggested that autovaccination by the attenuated inflammatory cells found in skin lesions of

psoriasis-like inflammation can be a therapeutic modality for such kind of inflammatory reaction.

Over the past decades, the effect of autologous T cell vaccine has been justified in several animal models of autoimmune diseases including experimental autoimmune encephalomyelitis murine autoimmune diabetes in nonobese diabetic mice, and collagen-induced arthritis (Kroger et al. 2018; Borghans et al. 1998; X. Huang, Wu, and Lu 2014). The rationale behind the efficacy of this vaccine has been accepted based on the observation that immunization with attenuated autoreactive T cells is capable of inducing T cell-dependent inhibition of autoimmune responses. The mechanism behind the efficacy of T cell vaccine has been subjected to be mediated by eliminating the autoreactive T cells (X. Huang, Wu, and Lu 2014). Indeed, our histopathological results from the autovaccinated mice showed multiple rich inflammatory cells including T cells, dendritic cells, and neutrophils (Figure 2). Our possible mechanisms of action for the autovaccine are through reinjection of attenuated T cell and/or the transfer of some inhibitory cytokines and inflammatory cells. Our proposed method for autovaccination could be generalized for also other inflammatory and autoimmunity dermatological conditions as vitiligo, pemphigus, atopic dermatitis and other similar conditions. It is considered as a simple and cheap approach that can achieve satisfactory results.



**Figure 1.** The response after seven days in each group



**Figure 2.** Comparison between different studied groups according to different parameters

## CONCLUSION

Our results in psoriasis-like skin inflammation may uncover some possible mechanisms of the action of auto-transplantation that has been used in different autoimmune diseases. For example, in vitiligo, melanocyte transplantation is a well-established modality where the epidermis or a full skin thickness is transplanted in the vitiliginous areas (Zokaei et al. 2019). According to our pilot study, we suggest that the transfer of inhibitory anti-inflammatory cells from the transplant could attenuate the inflammatory response and improve vitiligo. Further experimental and clinical studies are needed to assess our novel method of attaining rich inflammatory infiltrate and its possible use in an attenuated form as an autovaccine for the treatment of inflammatory and autoimmunity syndromes.

## CONFLICT OF INTEREST

Authors declare that they have no conflicts of interest.

## FUNDING

There is no financial support for this study.

## REFERENCES

Borghans, José A M, Rob J De Boer, Eli Sercarz, and Vipin Kumar. 1998. "T Cell Vaccination in Experimental Autoimmune Encephalomyelitis: A Mathematical Model." *The Journal of Immunology* 161 (3): 1087 LP-1093. <http://www.jimmunol.org/content/161/3/1087.abstract>.

- Fits, L. van der, S. Mourits, J. S. A. Voerman, M. Kant, L. Boon, J. D. Laman, F. Cornelissen, et al. 2009. "Imiquimod-Induced Psoriasis-Like Skin Inflammation in Mice Is Mediated via the IL-23/IL-17 Axis." *The Journal of Immunology* 182 (9): 5836-45. <https://doi.org/10.4049/jimmunol.0802999>.
- Huang, Liuye, Yuan Yang, Yu Kuang, Dapeng Wei, Wanyi Li, Qin Yin, Juan Pang, and Zhongwei Zhang. 2016. "The Impact of T Cell Vaccination in Alleviating and Regulating Systemic Lupus Erythematosus Manifestation" 2016.
- Huang, Xin, Haijing Wu, and Qianjin Lu. 2014. "The Mechanisms and Applications of T Cell Vaccination for Autoimmune Diseases: A Comprehensive Review," 219-33. <https://doi.org/10.1007/s12016-014-8439-6>.
- Johnson, Mary. 2012. "Laboratory Mice and Rats." *Materials and Methods* 2 (October). <https://doi.org/10.13070/mm.en.2.113>.
- Kroger, Charles J, Matthew Clark, Qi Ke, and Roland M Tisch. 2018. "Therapies to Suppress  $\beta$  Cell Autoimmunity in Type 1 Diabetes ." *Frontiers in Immunology* . <https://www.frontiersin.org/article/10.3389/fimmu.2018.01891>.
- Lowes, Michelle A, Mayte Suarez-Farinas, and James G Krueger. 2014. "Immunology of Psoriasis." *Annual Review of Immunology* 32: 227-55. <https://doi.org/10.1146/annurev-immunol-032713-120225>.
- Mori, Hiroki, Kojo Arita, Takayuki Yamaguchi, Midori Hirai, and Yoichi Kurebayashi. 2016. "Effects of Topical Application of Betamethasone on Imiquimod-Induced Psoriasis-like Skin Inflammation in Mice." *The Kobe Journal of Medical Sciences* 62 (4): E79-88.
- Ogawa, Eisaku, Yuki Sato, Akane Minagawa, and Ryuhei Okuyama. 2018. "Pathogenesis of Psoriasis and Development of Treatment." *The Journal of Dermatology* 45 (3): 264-72. <https://doi.org/10.1111/1346-8138.14139>.
- Zokaei, Shaghayegh, Dariush D Farhud, Mohammad Keykhaei, Marjan Zarif Yeganeh, Hoda Rahimi, and Hamideh Moravvej. 2019. "Cultured Epidermal Melanocyte Transplantation in Vitiligo: A Review Article." *Iranian Journal of Public Health* 48 (3): 388-99. <https://www.ncbi.nlm.nih.gov/pubmed/31223565>.

**Egyptian Association for Cancer Research (EACR)**

<http://eacr.tanta.edu.eg/>

EACR is an NGO society that was declared by the Ministry of Social Solidarity (Egypt) No. 1938 in 19/11/2014 based on the initiative of Prof. Mohamed Labib Salem, the current Chairman of EACR. EACR aims primarily to assist researchers, in particular young researchers in the field of cancer research through workshops, seminars and conferences. Its first international annual conference entitled "Anti-Cancer Drug Discovery" was successfully organized in April 2019 (<http://acdd.tanta.edu.eg>). Additionally, EACR aims to raise the awareness of the society about the importance of scientific research in the field of cancer research in prediction, early diagnosis and treatment of cancer. EACR is also keen to outreach the scientific community with periodicals and news on cancer research including peer-reviewed scientific journals for the publication of cutting-edge research. The official scientific journal of EACR is "International Journal of Cancer and biomedical Research (IJCBR: <https://jcbjournals.ekb.eg>) was successfully issued in 2017 and has been sponsored by the Egyptian Knowledge Bank (EKB: [www.ekb.eg](http://www.ekb.eg)).

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## ABOUT JOURNAL

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International Journal of Cancer and Biomedical Research (IJCBR), a publication of the Egyptian Association for Cancer Research (EACR), is a peer-reviewed online journal published quarterly. The journal allows free access (Open Access) to its contents and permits authors to self-archive a final accepted version of the articles on any OAI-compliant institutional / subject-based repository.

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**Aim:** The main aim of IJCBR is to attract the best research in animal and human biology in health and diseases from across the spectrum of the biomedical sciences at the molecular, cellular, organ, and whole animal levels especially those that are related to cancer research, including causes, prediction, diagnosis, prognosis and therapy.

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### Scope

The main aim of IJCBR is to attract the best research in animal and human biology in health and diseases from across the spectrum of the biomedical sciences at the molecular, cellular, organ, and whole animal levels especially those that are related to cancer research, including causes, prediction, diagnosis, prognosis and therapy.

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