

# Absent joining chain effect on immune response



**ASSIGN  
BUSTER**

## Critical Review of a Journal

Kallberg, E. and Leanderson, T., 2006. Joining-chain (J-chain) negative mice are B cell memory deficient. *European Journal of Immunology*, 36, 1398-1403.

### Overview

The journal article falls under the main subject area of cellular immune response, where the effect of the absence of joining chain locus on T- cell dependent immune responses on mice was explored. While the authors' previous study establishes the production of impaired IgM secretion from mice with inactivated joining chain locus, (Erlandsson, et. al., 20010), this particular study further investigated such findings in detail by determining the exact genetic background of the mice. Thus, this particular study aimed to further validate the authors' previous findings on early crosses of mice with absent joining chain and its concomitant effect on T-cell dependent immune response. The T- cell dependent B cell responses were analyzed using four experiments, namely: the immune response to the hapten 4-hydroxy-3-nitrophenyl and chicken gamma globulin (NP-CGG); analysis of the ratio between NP-specific K and  $\lambda$  antibodies; analysis of somatic mutations, and carrier priming experiment. It was found that mice with absent joining chain loci are deficient in " T helper cell activation during T cell -dependent B cell immune responses", (Kallberg and Leanderson, 2006).

This study was aptly technically described and appeals to an audience in the medical field such as immunologists, physicians, laboratory and clinical directors, etc. It consists of the following format: abstract, introduction,

<https://assignbuster.com/absent-joining-chain-effect-on-immune-response/>

results, discussion, materials and methods, acknowledgements and references.

## Introduction

The title appropriately indicates the effect of J-chain deficiency on B memory, which is the focal point of this study. Its well structured abstract completely and vividly presented the major points and the conclusion of the study. The objective, which can be found in the latter part of the introduction, however, was not clearly identified in the abstract and the text, but needs to be carefully ascertained by the reader.

## Results

The experimental results of the four experiments produced findings that correlate to and support the hypothesis of the study, i. e., J<sup>-/-</sup> mice have compromised T-cell dependent immune response. The specific findings are as follows:

1. Joining- chain deficient mice have compromised secondary immune response to 4-hydroxy-3nitrophenyl.

Although J<sup>-/-</sup> mice responded in the same way with the control group during the analysis of serum IgG anti-NP at all time points, there was a wide difference observed on after the 14<sup>th</sup> day point, which was clearly supported and plotted in the graph (Figure1). After the secondary response to NP-CGG, it was found that the recall response in mice without joining chain loci are lower than the control animals, which was further correlated to a lower

number of B memory cells. All raw data of the results pertaining to these findings were well supported by graphs (figures 1-3).

## 2. Mice without joining-chain have inefficient repertoire switch

Results showed that only 30% of the NP-binding antibodies in  $J^{-/-}$  mice were expressed, while 90% of the antibodies of the control animals were expressed, confirming the negative effect of the joining chain on the efficiency of T-cell immune responses. This was supported by a bar graph of the results and a graphical illustration of the NP expression on splenic B memory cells.

## 3. $J^{-/-}$ mice have a lower somatic mutation rate

The data were presented in a table showing the total mutations of  $J^{-/-}$  mice with only 5 and 17 for IgM and IgG respectively, compared to 19 for IgM and 28 for IgG of the control animals.

## 4. J-chain deficient mice have a defective priming of T-helper cells

The results of a carrier priming experiment confirmed that the T lymphoid, and not the B lymphoid compartment in  $J^{-/-}$  mice was affected. This was statistically proven by the unpaired t-test results which obtained a value of  $p < 0.001$ , which means that the difference between the  $J^{-/-}$  mice and the control group is statistically highly significant.

All of the four findings are new discoveries in the area of cellular immune response. These findings were supported by raw data which were tabulated and plotted into graphs. The use of the unpaired t-test was appropriate because the data required a systemic linear layout, (Valiela, 2001, p. 93).

## Discussion

It was clearly pointed out in the discussion of the results that  $J^{-/-}$  mice produce phenotypically deficient T helper cell characteristics as evidenced by their responses to the four experiments. Thus, these findings confirm that the effect of the “ joining chain deficiency interferes specifically with the T-helper-dependent development of a sublineage of immune B cells that contributes marginally to the primary, but significantly to the secondary immune response”, (Kallberg and Leanderson, 2006). These major points were supported by data from other previous researches. Linton and others (1989) studied the lineage and finds “ the existence of a distinct precursor cell subpopulation that is responsible for the generation of B cell memory”. A parallel study previously conducted shows that “ mice devoid of J-chain expressing cells are partially immune compromised,” (Erlandsson et. al., 2001). However, there are issues that still remain to be solved and therefore warrant further investigation. The reason for the high degree of variability in the immune response at day 14 after immunization in  $J^{-/-}$  mice needs to be established. Moreover, the specific role that the J-chain molecule plays in its interference with B cells which contribute to both primary and secondary immune responses, needs further study.

## Materials and Methods

Four experiments were conducted to test the hypothesis: analysis of immune response to the hapten NP-CGG, analysis of ratio between NP-specific K and  $\lambda$  antibodies, analysis of total frequency of somatic mutations and a carrier priming test. These tests were appropriate for this study as evidenced by the

<https://assignbuster.com/absent-joining-chain-effect-on-immune-response/>

reliability of the data obtained, all of which supported the hypothesis.

However, the predictive value of positive ELISA test results would have been improved if they were validated with an independent supplemental test that is highly specific, such as the Western Blot . This is because the ELISA test “ can give a positive result when there are no antibodies (false positive), and it can give a negative result when there are antibodies (false negative)”, (Myers and Well, 2003, p. 98). In a parallel study conducted by Erlandsson and others (2001), the reliability of the ELISA test was further improved by the use of the Western Blot.

## Conclusion

In the final analysis, the strength of this study lies on its significance and contribution in cellular immune response. The importance of B cell memory in protective immunity has been evidenced by previously published researches and clinical studies. Furthermore, it was already established that “ J-chain expression was a clonal property already established in naïve, peripheral B lymphocytes, (Erlandsson, et. al, 2001). In the same vein, the key regulators of the germinal center that are important in the induction of B cell memory and molecular consequences of cellular immune response with regard to B cell compartment have been defined (Williams and Ahmed, 1999). In humans, studies have indicated the presence of J - chain -negative plasma cell population and their ability to produce polymeric immunoglobulin A, (Kutteh, et. al., 1982). This particular research served to further validate these findings, and at the same time, provide more exact, specific information regarding the influence of the joining chain on B cell memory, by postulating that the absence of the joining chain on mice negatively affects

<https://assignbuster.com/absent-joining-chain-effect-on-immune-response/>

the efficiency of B cell memory, and thus, lower cellular immune response.

The findings in this study are new, yet pivotal discoveries in the area of cellular immune response, and could serve as bases for future researches of this nature.

## **References:**

Erlandsson, L. Akerblad, P., Vingsbo-Lundberg, C., Kallberg, E., Lycke, N., and Leanderson, T., 2001. Joining chain expressing and non expressing B cell populations in the mouse. *Journal of Experimental Medicine*, 194, 557-570.

Kallberg, E., and Leanderson, T., 1994. Expansion of kappa and B cells during the primary immune response to 4-hydroxy-3-nitrophenyl acetate in BALB/c mice. *Immunoll. Lett.*, 41, 287-290.

Kallberg, E., and Leanderson, T., 2006. Joining-chain (J-chain) negative mice are B cell memory deficient. *European Journal of Immunology*, 36, 1398-1403.

Fraenkel, R. E., and Wallen, N. E., 2001. *Educational Research: A guide to the Process*. Mahwah, NJ: Lawrence Erlbaum Associates.

Kutteh, W. H., Prince, S. J., Mestecky, J., 1982. Tissue origin of human polymeric and monomeric IgA. *The Journal of Immunology*, 28 (2), 990-995.

Linton, P. J. L., Decker D. J., and Klinman, N. R., 1989. Primary antibody-forming cells and secondary B cells are generated from separate precursor cell subpopulations. *Cell*, 59 (6), 1049-1059.

Moxley, J. M., 1992. *Publish, Don't Perish: The Scholar's Guide to Academic Writing and Publishing*. Westport, CT: Praeger.

Myers, J. L., and Well, D., 2003. *Research Design and Statistical Analysis*. Mahwah, N. J: Lawrence Erlbaum Associates.

Williams, M., and Ahmed, R., 1999. B cell memory and the long-lived plasma cell. *Current Opinion in Immunology*, 11 (2) 172-177.

Variela, I., 2001. *Design, Analysis and Communication of Scientific Research*. New York: Oxford University Press.