

General comments for writing the essay

Our aim in asking you to write an essay as part of the Master module is for you to learn

1. to obtain information from the scientific literature,
2. to synthesize information from diverse sources,
3. to use it to critically evaluate and discuss arguments or ideas, and
4. to then communicate these to the reader.

Obtaining information from the scientific literature:

The most frequently used search machine is PubMed (<http://www.ncbi.nlm.nih.gov/pubmed>).

You will find very helpful tutorials to learn about efficient searching and also to personalize your own searches (MyNCBI). MyNCBI even allows you to create your own bibliography.

Random Google searches will almost never give you any results! Google Scholar (<http://scholar.google.de/>) however is similar to PubMed and finds scientific publications.

Specifically for the master module Genetic Models in Immunobiology we want you to find one key primary research paper to the given topic (no review) and suggest the following organisation for the essay:

1. Introduction

An introduction is used to define the scope of the essay and to give enough background information as is necessary for the discussion of the topic. It should be brief (no more than about one-fifth of the essay length). It should include the following:

- A. Background: A brief survey (historical) of the information relevant to the topic serves to place the topic in context for the reader.

What was known before the experiments in the publication were performed?

- B. Depending on your topic, it may also be necessary for you to ***define important technical terms***, or special uses of words may need definition.

- C. Aim of the study: Most publications clearly state the aim of the study. You should very precisely and clearly formulate ***why the experiments were done. Which scientific question is specifically addressed?***

2. Results

Summarise the results and highlight the key findings. Many papers “tell a story” i.e. the results are developed in a stepwise manner. Results obtained in the first experiments define the rationale for more experiments and so on. Each individual experiment allows certain and very specific conclusions. You should learn to be very precise in formulating the conclusions from an experiment or a set of experiments.

It may be helpful to show some original data (Figures / Tables) copied from the publication for the discussion of the key findings. We don't want you, however, to copy every figure from the paper just to fill the space.

In summary, your results section should not be just a (shortened) reproduction of the original results.

3. Discussion

The discussion should:

- (A) Integrate the major results presented in results section.
- (B) Provide a summary of the major findings and the interpretation
- (C) Critically evaluate whether the conclusions drawn by the authors are justified (in the high-ranked papers that you will pick they mostly are justified! It is usually one job for the reviewers / editors to check this.

4. Outlook and future development

Specifically for the essay in our master module you should try to give a summary of the development of the field **after** the publication appeared. *What do we know now?* Scientific discovery never stops; new results create more questions, for example about the molecular mechanisms or about the function of a cell or a molecule in a different situation. Also the medical relevance might be important and noteworthy to elaborate on in this section. It is probably a good idea to first search for a very recent review article (very good and up-to-date reviews can be found in Nature Reviews Immunology and Annual Reviews of Immunology). We don't want you to write a comprehensive review (yet) as this a quite difficult task but try your best to give a short overview (max. 1 page) about the recent development of the scientific field. A timeline (as a graph or a table) might help.

5. References (a maximum of 20 References are allowed in your essay)

In your text, where you refer to other person's work, include the name of the author and the publication date: e.g. *In some areas, hedges between roads have been found to contain more woody species than those between fields (Willmot, 1989)*. If there are two authors like this (Baltimore and Tonegawa, 1979) or more than two authors like this (Spilianakis et al., 2008). *Willmot (1980) found that hedges next to roads contain more woody species than those between fields*. Where you cite multiple reference sources together, list them in chronological order (e.g. Wilcove et al., 1986; Saunders et al., 1991; Opdam et al., 1994; Robinson et al.,

1995). The bibliography should be arranged alphabetically with one consistent style. We use the style of the Journal "Cell"; here is an example:

Ghia, P., Grawunder, U., Winkler, T.H., and Rolink, A. (1997). FACS Analysis of B lymphopoiesis in mouse and human bone marrow. In *Immunology Methods Manual: The comprehensive Sourcebook of Techniques*, I. Lefkovits, ed. (San Diego, Academic Press), pp. 945-953. ***This in an article in a book***

Grawunder, U., Leu, T.M.J., Schatz, D.G., Werner, A., Rolink, A.G., Melchers, F., and Winkler, T.H. (1995). Downregulation of RAG1 and RAG2 gene expression in preB cells after functional immunoglobulin heavy chain rearrangement. *Immunity* 3, 601-608. ***This in an article in a scientific journal***

Hoffmann, A., Kerr, S., Jellusova, J., Zhang, J., Weisel, F., Wellmann, U., Winkler, T.H., Kneitz, B., Crocker, P.R., and Nitschke, L. (2007). Siglec-G is a B1 cell-inhibitory receptor that controls expansion and calcium signaling of the B1 cell population. *Nat Immunol* 8, 695-704.

Parker, M.J., Licence, S., Erlandsson, L., Galler, G.R., Chakalova, L., Osborne, C.S., Morgan, G., Fraser, P., Jumaa, H., Winkler, T.H., *et al.* (2005). The pre-B-cell receptor induces silencing of VpreB and lambda5 transcription. *Embo J* 24, 3895-3905.

Suggested total length of the essay: 8 - 10 pages

Very good guidelines for scientific writing can be found here:

https://www.monash.edu/__data/assets/pdf_file/0010/69418/essay-writing-guidelines.pdf

or if you enter "Writing biology reviews site:edu" or "Writing biology essays site:edu" in Google.

(if you omit ":edu" you get all the commercial "ghost writers" that offer you essay writing for a lot of money ;-)

transcription factors. Mouse models were very informative in this respect. Find and discuss a key paper describing a key transcription factor for plasma cell differentiation.

4. Regulatory CD4 T cells control adaptive immune responses (TW)

Basic literature: Janeway chapter 8

It is now widely accepted that the normal immune system harbors a regulatory CD4-positive T-cell population specialized for immune suppression (these cells have been termed “suppressor T cells” in earlier days – at that time they were believed to be CD8-positive). Characterization of this autoimmune-suppressive CD4⁺ T cell population revealed that they constitutively expressed the CD25 molecule, which made it possible to distinguish them from other T cells, delineate their developmental pathways, in particular their thymic development, and characterize their potent *in vivo* and *in vitro* immunosuppressive activity. Recent studies have shown that CD25⁺CD4⁺ regulatory T cells specifically express the transcription factor Foxp3. Genetic anomaly of Foxp3 causes autoimmune and inflammatory disease in rodents and humans. Find the papers that identified FoxP3 as crucial transcription factor for the generation of normal levels of regulatory T cells and discuss the results of the publication(s).

5. Micro-RNAs as regulators of lymphocyte development and function (LN)

Basic literature: no Janeway chapter, but: Baltimore et al. (2008) Nat.Immunol. 9, 839

MicroRNAs (miRNAs) are a new key element of gene regulation in several organisms. In the last 3-4 years it became evident that miRNAs are responsible for the fine-tuning of gene expression in many developmental processes. miRNAs also affect mammalian immune cell differentiation and regulate immune responses. This has been demonstrated in genetically modified mice, in which miRNAs were either knocked-out or over-expressed in lymphocytes. The effects on the immune system was often profound. Find and discuss one of these examples where either one specific miRNA was analysed in transgenic mouse systems or where crucial enzymes of this pathway were deleted *in vivo*.