

immuneXpresso

Frequently Asked Questions



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Q1: What type of information does immuneXpresso provide?

immuneXpresso (iX) allows to learn about literature-reported interactions between various cell types and regulatory molecules (cytokines and chemokines) these cells employ for inter-cellular signaling. Interactions captured by iX include both direct cytokine binding/secretion events and more distant, indirect influencing relations, for example cytokines mediating cell differentiation or impacting its proliferation without necessarily binding directly. This information is obtained via Text Mining of the PubMed article abstracts, while sophisticated analysis is performed in order to confidently detect semantically related cells and cytokines. immuneXpresso goes beyond exact matches – various possible synonyms and forms of writing are identified and standardized to representative IDs and labels. In case of cells and diseases, those come from the official Cell Ontology and SNOMED CT respectively.

For each interaction, immuneXpresso identifies whether it is the cell or the cytokine that triggers the interaction (e.g., T-cell secreting IL-2 vs IL-6 activating B cells). In addition, as an experimental feature, immuneXpresso detects the cell-cytokine interaction polarity (called "sentiment" interchangeably) including: positive (e.g., induces), negative (e.g., inhibits) or neutral (e.g., correlate) interactions. immuneXpresso results may be limited to specific disease context and to specific subset of papers (by publication years or article type of interest).

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In addition, immuneXpresso supports a less stringent co-occurrence analysis whereby all instances of specified cells or cytokines co-occurring in the specified search context are identified.

Q2: What kind of terms can I search for?

You may look for cells, cytokines and diseases. immuneXpresso identifies interactions between the specified cells and cytokines within the context of the specified diseases.

If no search term was specified for some category, the results will not be limited for that category. For example, if a cell search term is specified but there is no cytokine search term set, interactions between this particular cell and any cytokine will be presented. You can choose as many terms as you wish per category, for example, you can specify no cells, two cytokines, and five diseases. The result will be all cell-cytokine interactions identified for the specified cytokines with any possible cell, within any of the selected diseases.

Q3: Can I search for more than one term per category?

Yes, you may choose as many terms as you wish per one category. See [Q2: What kind of terms can I search for?](#) for more details.

Q4: What happens if I search for a cytokine without specifying any cell term?

immuneXpresso will identify and present interactions between the specified cytokine and all possible cells within the requested context. Moreover, in a separate table (*Co-occurrence Tab*) you will get a list of all occurrences of that cytokine within the context of interest, without relation to any specified cell.

Q5: How can I enter a term?

You may enter a term of interest in two ways: 1) start typing your term within the *Specify your filter term* input field on top. Your input will be autocompleted and you will be presented with a list of relevant terms to choose from; 2) upload your list of terms listed in a .txt file, one term per line. In order to initiate upload, use the arrow button on right of the relevant category section.

Q6: How can I upload a file and what type of file?

Per any category (cell, cytokine and disease) there is an icon on right, allowing you to upload a preselected list of terms as a .txt file. The file should include terms of only one category at a time and the terms must be arranged as a list of one term per line.

Q7: Does immuneXpresso find exact matches only?

No, immuneXpresso can identify cell or cytokine names also by their synonyms and various way of writing (e.g., plural instead of single, upper/lower case, with/without hyphens).

Q8: What is the difference between co-occurrence and interaction results?

The *Interactions* tab shows semantic relations identified between the chosen cells and cytokines within the selected context. Interaction directionality (whether it is the cell or

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cytokine that triggers the interaction) and polarity (positive, negative, neutral) are shown graphically. The *Co-occurrence* tab lists all separate mentions of either the selected cells or the selected cytokines under the context of interest, without limiting to interactions. All relevant articles for each result are reachable via *Articles* links on right.

Q9: Does immuneXpresso look within full articles or abstracts only?

At this stage immuneXpresso examines abstracts only. But we are already exploring methods to provide Full text support.

Q10: What is the meaning of the E-score?

Enrichment score (E-score) is calculated as the ratio of the number of actually observed interaction occurrences to that expected by chance, given cell/cytokine frequencies in the corpus. This score reflects the interaction confidence for cells or cytokines rarely appearing within research papers.

Q11: How I can extract the list of cytokines mentioned for Crohn's disease during the last 2 years?

You may either start typing the disease name within the *Specify your filter term* input field on top or upload a .txt file listing disease names of interest one term per line using the arrow button on right of the *Disease* filter section. Within the *Article* section, choose the relevant years and click the *Search immuneXpresso* button on top to get the results. In this case, the *Interactions* tab will show all interactions between any cytokine and any cell within the Crohn's disease context. The *Co-occurrence* tab will list occurrences of any cells or cytokines within the articles that immuneXpresso identified as related to Crohn's.

Q12: If I specify "T-cell" search term, will immuneXpresso results include papers mentioning Th1?

Yes, by default. You can control this behavior. Once a cell term is selected, a button showing two small arrows will appear on its right. Click this button to exclude cell sub-populations from the results and show matches for T-cell (*per se*) only. Clicking this button again will cause sub-populations to be included, meaning both matches for T-cell, Th1, Th2, Th17 and more will be returned.