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Scientific Apps are here (and more will be coming)

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Abstract

The world of Apps is now well upon us although the application of this tool was a bit slow in coming to the scientific community. In this column I will briefly take a look at some of the Apps now available that are applicable to biomedical research. I will restrict my coverage to the Apple format, not because I am totally an Apple user (my PC is a Dell) but only because I do not have an Android device.

Keywords

Apps; Mobile devices

1. Immunology related Apps

One of the first commercial sources to come out with a key Immunology App was BioLegend who released free apps covering both human and mouse CD antigens and another app covering cytokines and chemokines. The iPhone/iPod apps are distinct with **BioLegendCD** for the antigens while **BioLegendIL** is for cytokines and chemokines. The data is fairly comprehensive with both Apps linking to the GenelD. In addition, receptors are noted where appropriate and tissue specific expression is also included for the CD antigens. BioLegend combines all this information on the iPad version (**BioLegend Tools**) along with a number of different tools related to flow cytometry and links to all their detailed pathway maps.

Wiley has also published a simple version of the CD antigen list (**CD Antigens**) although one has to surmise that the list is just the human genes since the App does not actually state if it is human or mouse. This App is suitable when one is seeking the most basic information about the CD antigens.

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Conflict of interest

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A very useful App for chemokine information is the **CKGuide**. The listing of chemokines is very comprehensive and the information page includes other names, receptors, orthologs and chromosome information. Each listing also includes the GenBank accession number but unfortunately does not provide a direct link to the GenBank information.

Another interesting App is **ImmGen**. This App represents an international effort to characterize gene expression in the mouse immune system. One can choose a cell type and a gene of choice and you will see a graphical representation of the relative gene expression in B cells, myeloid cells, α/β T cells, γ/δ T cells, NK cells and activated T cells. When one opens a chart, tapping on the cell designation indicates how many replicates have been performed and a bit more information as to the specific cell type. One can also search for "friends", "family" and "neighbors" of your gene of choice. Users can also get a sense of relative gene expression just from the home page as different levels of expression are depicted as brighter colors in the different cell type subsets in the six cell categories.

2. Other Apps

An App of great usefulness to those who have forgotten the metabolic Pathways is **iPathways**. This App list hundreds of metabolic pathway maps straight off the wall charts that every student of biochemistry older than 30 should remember (not always fondly). While most of the pathways covered are metabolic in nature, you can find others including Wnt and FGF. Don't expect broader pathways such as cytokine signaling but nevertheless, this App will be useful for those whose interests are turning to cell metabolism.

A fun App is **Molecules**. For structural biochemists, this App loads the 3D structure of molecules whose structure has been determined (PubChem and the Protein Data Bank) and allows one to flip it in all directions. While not very instructive for those not well versed in the structure of molecules, each molecule is a mini art show in itself.

BioGene is another App worth considering. Type in the gene name and it brings up some very basic information about the gene and provides a direct link to the OMIM page. The OMIM page contains detailed information about the gene of choice. **GeneIndex** does something similar but, typing in IFNG for example, will bring up Interferon-gamma and the two receptor chains. **Genetic Code** lets you type in a specific codon as well as providing a Codon Table, Codon Circle, Codon alignments and the codes for the amino acids and nucleotides. Pretty basic but useful for students.

Life Technologies provides a number of different Apps but a very useful one is **DailyCalcs**. This tool provides for molarity calculations, unit conversions, dilutions, formula weight, a cell culture reference (e.g. how many cells are in a confluent 100 mm dish) and a media preparation guide. Equally useful is **ProtocolPedia**, where hundreds of protocols are listed for all fields of biomedical research.

3. Meeting Apps

The creation of Apps for scientific meetings is in its early stages. Experimental Biology was one of the first (see **EB2010, EB2011**) but the features of these Apps were pretty minimal.

The American Society for Microbiology generated a very useful App for their meeting (**ASM2011**) while the joint meeting of the International Society for Interferon and Cytokine Research and the International Cytokine Society has an App (**Cytokines 2012**) that has evolved over 3 years as the technology matures. In my mind the ideal meeting Apps will have places within the App for note taking, twitter or RSS feeds by session chairs to let attendees know if a session is on time, a scheduler to allow one to format a personal schedule for selected talks and posters, pdfs of recent papers by the invited speakers as well as personal interviews with them about their oral presentations, methods to arrange meetings with other attendees (e.g. specific poster presenters), access to posters or talks via a tablet format and other features that will enhance the meeting experience.

4. Just for fun

While science is a serious endeavor, there is occasional time for a little bit of fun, especially when your gels are running or you are about to fall asleep in a very boring seminar. **Biofacts** gives you more information than you probably ever want to know (e.g. Orchids have the smallest seeds). Just keep tapping to get additional (useful?) information for discussions when you are having beer and pizza. **Fluxion** allows you to grow cells in the lab and change their reproduction rate, mutation rate and toxicity resistance among other variables. Cells change size and color in response to changes in the variable parameters. **Gene Lab** allows you to make creatures of various forms and clone, mutate and breed them. You can become your own deity as you create new life forms. **Gathering Light** is a new game just released by Gibco that challenges you to achieve tranquility by tapping on peaceful images and avoiding stressful images. Of course the first time I played I had no idea of what I was doing and I achieved a score of — 1, meaning that the stress of working *n* the government has certainly become overwhelming...

In summary, the number of Apps for scientific use is growing rapidly and will only be limited by the imagination of their creators. If you are not using at least a few, you are certainly old fashioned 20th century...

"We've replaced you with an app."