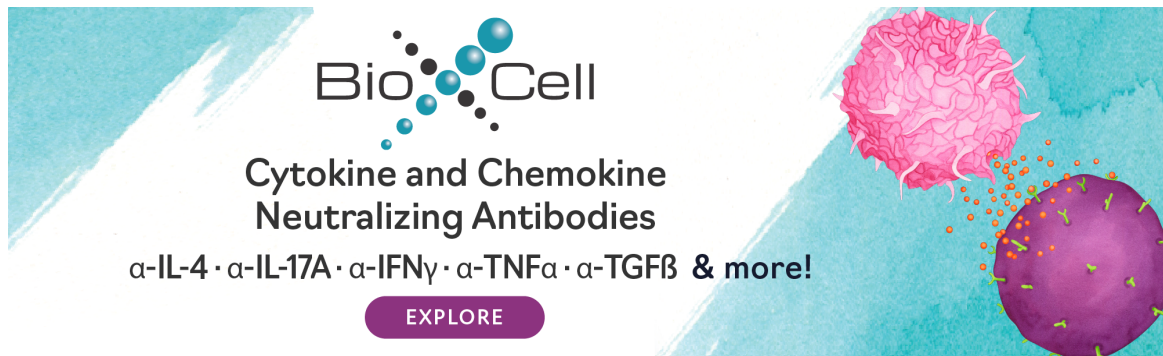


The BioCell logo features the word "Bio" in a sans-serif font, followed by a cluster of blue and black dots of varying sizes, and then the word "Cell" in a larger, bold sans-serif font. To the right of the logo is a stylized illustration of two immune cells: a pink, spiky cell at the top and a purple, spiky cell at the bottom, both surrounded by small orange dots representing cytokines or chemokines. The background is a light blue gradient with white brushstrokes.

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Modeling Immunological Networks in an Educational Setting using Cell Collective

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One challenge in the teaching of immunology is the complexity of the subject. Immunology presents a long list of unique cells, signaling molecules, receptor-ligand interactions, regulatory mechanisms, developmental pathways, and outcomes that can feel burdensome to instructors and unapproachable to students. The beauty of this subject, however, is that these unique features interact in networks that parallel those in other biological fields. Visualizing the interactions between tissues, cells, and molecules of the immune system and their outcomes can promote immunological literacy and a broad understanding of biological systems.

Cell Collective (cellcollective.org) is an open-access, approachable software system that allows students and researchers alike to build models and perform simulations of biological processes. Students can use this interactive platform to probe cell-cell interactions, signaling pathways, metabolic networks, etc. while building systems thinking and computational skills, which are critical for success in STEM fields. After building models, real-time simulations can be run to visualize and understand the dynamics of the biological system under conditions of environmental pressure, disease, mutation, etc. Instructors can assess student knowledge by building assessments into modules in a formative or summative manner. Because it is free, user-friendly, and offers a host of pre-built training, educational and experimental modules, Cell Collective is ideally suited for use in all types of educational settings.