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Small Molecules for Cell Biology

Motonari Uesugi, Ph.D.

Institute for Integrated Cell-Material Sciences and Institute for Chemical Research, Kyoto University

In human history, bioactive small molecules have been utilized in three major applications: as medicines, as agrochemicals, and as molecular tools for basic biological research. Our laboratory has been focusing on the discovery and utilization of small-molecule tools for cell biology: we have been discovering unique synthetic small molecules that modulate fundamental characteristics of human cells, with the goal of understanding cell physiology and human diseases. This presentation provides a quick overview of our recent research programs with a special emphasis on the discovery and utilization of “wrenchnolol,” a molecule that modulates gene expression in cells, and “adhesamine,” a dumbbell-shaped synthetic molecule that controls the adhesion and growth of cultured cells.

In this presentation, I also like to introduce our efforts to explore the 4th possible application of small molecules: boosting tools for cell therapy. Some of the molecules that modulate fundamental characteristics of human cells may serve as tools for cell therapy as well as basic cell biological research. In industry, small-molecule drugs and biopharmaceuticals, including cell therapy, have long been considered to be competitive with each other. However, it may be possible to use small molecule tools in the field of biopharmaceuticals.