

Multidrug resistance proteins are proteins which normally sit on the surface of cells and pump toxic compounds out of the cell, protecting it. Cancer cells can sometimes produce too much of these proteins and then it becomes difficult to kill cancer with chemotherapeutic drugs, as its cells have grown resistant. This is an important clinical problem, but an interesting discovery from our lab has allowed us to potentially use this drawback paradoxically to our advantage in cancer therapy. It turns out that when an antibody (a specific binding protein) against one of the multidrug resistance proteins binds to the protein from the outside, the cell pulls the whole complex – protein and antibody together – inside the cell by a process known as endocytosis, quickly and specifically. The goal of our project is to check whether this process, freshly discovered and published by us, is universal (i.e. occurs for more than just this one protein/antibody pair), and to try to use a Trojan horse approach by tying a toxic compound (small molecule or protein) to the tail of the antibody. Thus, when the cancer cell is pulling the multidrug resistance protein together with the antibody inside itself, it will be also pulling in the toxin and committing suicide, which is what we want to happen to a cancer cell.