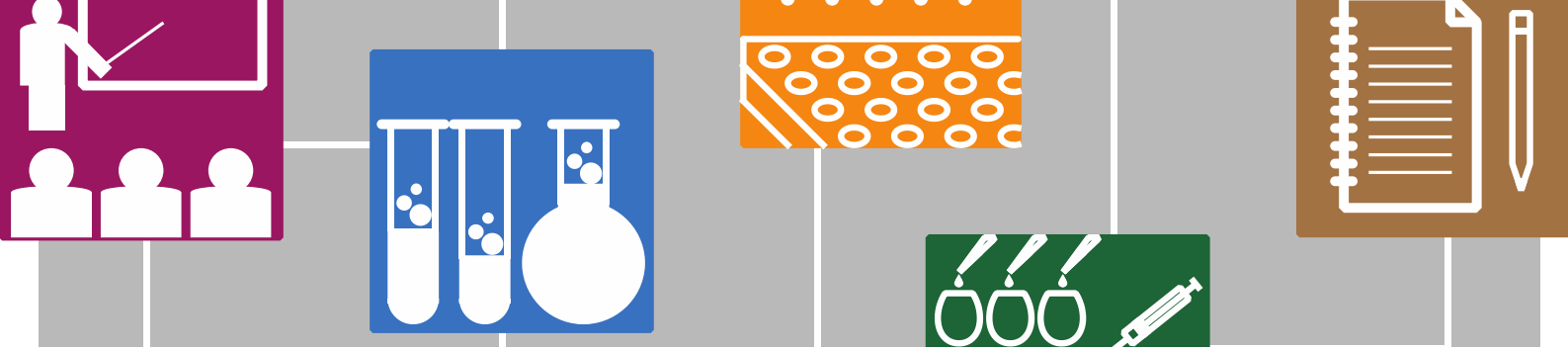

Target and Drug discovery

"Not every targetable protein is drugable and not every drugable protein is a target."

It is important to keep the above in mind when looking for a perfect target-drug combination. Many different aspects contribute to a perfect target-drug combination. Three important features that define a potential target molecule as well as a potential drug compound are **specificity**, **activity** and **bioavailability**. Obviously, the specifics of these features are dependent on the envisioned use of the target-drug combination. For example, for imaging purposes, drug delivery, or treatment, the features can differ. In this case, we are looking for a therapeutic target-drug combination, in particular, a target molecule that is involved in the response to irradiation and a drug that interferes with this response by blocking the target. For an effective combination, the target and drug should comply to the following specifics:

	Potential Target Molecule	Potential Drug Compound
Specificity	The target molecule should be as specific as possible for the cell of interest (in this case the tumor cell). This ensures that only tumor cells are affected and less toxicity in normal cells occurs.	The drug compound should show specific and high affinity binding towards the target molecule. This prevents 'off target' effects of the drug which can be an underlying cause of toxicity.
Activity	The target molecule should be essential for the function of the tumor cell, in particular in the response to radiation. This ensures that blocking the target will have an effect on tumor cell survival.	The drug compound should not only bind to the target molecule but also block the activity of the target. This prevents the cells from responding properly to radiation which increases the chance of cell kill.
Bioavailability	The target should be easily accessible (reachable) by the drug. Thus, targets on the surface of cells are preferred as these can also be easily reached by larger molecules like e.g., antibodies.	Once it reaches circulation, the drug compound should be available in adequate therapeutic levels and for a sufficient period of time. This also affects the duration of the drug effect.

Tip: By replacing the specific features of each drug with numerical values, you can generate a 'score' for the target and the drug. This will help to reveal the two most potent target molecules and the 10 most potent drug compounds.