

Greg

Define your research question

Public level

We want to be able to make large quantities of a rare natural product that might help cure cancer.

Disciplinary level

Discipline: Chemistry

We want to find an economically viable process (i.e. in high overall yield) for the synthesis of Talinexatol, a natural product found in the gut of deep-sea jellyfish, which has been found to halt the spread of foot and mouth cancer.

Subfield level

Subfield: Synthetic Organic Chemistry

We would like to optimize the current 21-step synthesis of Talinexatol to improve its overall yield from around 5% to 20% or higher. This will involve either optimising the lower yields steps, or developing an entirely new pathway to the target molecule. In particular, the 7th step in the seminal JACS paper (a double, asymmetric dehydrogenation reaction) has a reported yield of only 19%. A more recent paper in Angewandte Chemie reported a similar transformation at almost quantitative yields, by using a different catalyst and solvent blend, albeit on a radically different molecule.

Lab level

If we change the chelating groups on the catalyst for the double, asymmetric dehydrogenation reaction reported in Angewandte to something more hydrophobic, such as tri(*t*-butyl)amino groups, and use a more non-polar solvent blend at higher temperature (e.g. refluxing hexadecane), we may be able to use this high-yield synthetic reaction to dramatically improve the overall yield.

Elevator Pitch

Headline

(This example is written from the perspective of a scientist working in industry, not academia. In this case, the person in the elevator is a potential investor in your new company, or the chief financial officer of the company that already employs you. Either way, you are looking to get them to invest in the project.)

We can help cure cancer by doing some very cool chemistry and make a lot of money.

Elaboration

Nature has this amazing cure for cancer, but it's really rare and hard to find in the jungle. In the lab we've figured out a way to improve on an old and expensive synthetic technique, so much so that it is now profitable to make. With current demand forecasts we reckon we can provide a real rate of return higher than any other new drug on the market.