

# My Exchange at Duke University, USA

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In short, I enjoyed (almost) every aspect of the nine months I spent in the United States for my master thesis:

Let me start with the science: The research group of Prof. Ashutosh Chilkoti I had chosen for my master thesis mostly works on drug delivery vehicles based on their “signature” biopolymer: Elastin-like polypeptides (ELPs). ELPs are recombinantly expressed and highly biocompatible polymers that consist of repeats of the pentapeptide VPGXG (in which X can be any amino acid except proline). By using analogous physicochemical principles as are employed in polymersomal and liposomal drug delivery systems, the Chilkoti lab has developed many different amphiphilic ELP constructs that self-assemble into micellar nanoparticles. These nanoparticles are then typically functionalized with cytotoxic/tumor-targeting ligands and/or loaded with anticancer drugs and tested in both *in vitro* and *in vivo* experiments. The main project I worked on during my nine months at Duke University was about investigating the effect of the critical micelle concentration (CMC) on the potency of ligand-bearing, self-assembled nanoparticles. The hypothesis was that since many anticancer ligands greatly benefit from multivalent display on nanoparticles, we would observe a significant drop in potency upon nanoparticle disassembly at concentrations below the CMC. Through a series of experiments we were able to prove that the CMC indeed was a major limitation and that this issue could be overcome by chemically crosslinking the nanoparticles so they could no longer disassemble. For certain ligands, introducing molecular crosslinks increased their potency by more than four orders of magnitude down to the mid-picomolar range.

Overall, I greatly enjoyed working in the Chilkoti lab. Though the research group is quite big with around 30 scientists and I thus did not meet with Prof. Chilkoti too often, the PhD student that acted as my supervisor was great! He was always available when I had questions or needed guidance but also gave me enough freedom to make my own decisions and test some of my own ideas. I would certainly say that this experience has made me “grow” as a scientist more than any of my previous internships.

Outside of the lab I spent a lot of my free time on bike rides in the countryside. As Durham is a medium sized city (250'000 inhabitants), it doesn't take you very long to leave the urban areas behind you and appreciate the fresh air, farms and forests in the rural areas of North Carolina. As I had joined the Duke Triathlon Club shortly after arriving in the U.S., I quickly got the insider tips about the most scenic routes in the area – and there were quite a few! If you are now thinking that it must have been quite dangerous to ride a bicycle in the U.S. – No, not really... Sure, the U.S. is *the* car country in the world but I generally felt very safe on my bike

particularly as you get treated like an alien by most cars (meaning that they will be incredibly cautious and leave a lot of space when passing you).

Outdoor activities are generally something that I can highly recommend if you were to ever go to North Carolina: Though the months of July and August can be quite tropical with temperatures constantly above 30°C and high humidity, Spring and Fall are mild and simply wonderful. As Durham hardly ever has days of constant rain, you will find most days to be quite perfect to do things outside.

During my time in Durham, I lived at the “Student Exchange House” which is a fully furnished house owned by a lovely British couple the rooms of which are exclusively given to international exchange students. In retrospective, choosing this type of accommodation was a great decision. Like this, I did not have to deal with organizing furniture and immediately got to know a lot of people. Together with the four other students living in the house, I did countless trips to the beach, the countryside and we even went skiing once! Furthermore, living with people that are in the same situation as you and might be similarly overwhelmed/confused by the American culture was a great thing to have (more on this in a minute)!

During Summer, I then also left the state of North Carolina to visit some other places in the U.S.: I spent a week each in Chicago and Washington D.C. with my family and later on did a two-and-a-half week roadtrip in the southwest of the U.S. (California, Arizona, Nevada, Utah) with my girlfriend. Particularly the latter trip was simply breathtaking! I can highly recommend visiting any of the national parks in that area! These trips were also a very welcome break to my work in the lab which was quite intense and also took up some weekends from time to time...

The only thing that I would not rate 10/10 is the American culture. Before coming to the U.S. I had the typical European expectation of the stereotypical (southern) American: Loves cars, loves meat and burgers, loves guns, loves Jesus, loves big things and most of all: has a very superficial way of interacting with people. At the time, I was sure that this was nothing more than a typical stereotype that would quickly be proven otherwise once I arrived in the U.S. Well, I was (mostly) wrong... Though I generally have no issue at all working with people with different values than myself, the superficiality-part really got on my nerves. I would have loved to make more American friends while I was at Duke but if the other person only wants to talk about the latest sports results, the cheap food he had bought yesterday or the newest YouTube sensation but never ever voluntarily talks about personal stuff, then that becomes quite impossible. Luckily, a significant fraction of our lab members was non-American so I still ended up making a lot of new friends... ;)

