## Summary

The research team of chemist and engineer Daniel Heller creates new nanoscale materials that are specially designed to improve biological research or solve clinical problems.

Chemist and engineer Daniel Heller makes nanoscale materials that are specially designed to improve biological research or solve clinical problems. Using their diverse sets of expertise, members of his lab work closely together to speed developments in cancer research, diagnosis, and treatment.

The day we visited the lab, team members were busy developing carbon nanotube–based sensors to detect early-stage cancers, as well as nanoparticles to target drugs that treat metastatic tumors — but they still made time to eat lunch outside on a sunny day.

What follows is the video transcript.

---

My name is Dan Heller. I am a lab head at Memorial Sloan Kettering in the Sloan Kettering Institute, and my lab focuses on nanotechnologies for the diagnosis and treatment of cancer.

Here in the lab we're trying to make nanoparticles that will actually target and stick to the sites of cancer. The goal here — after we make these nanoparticles — is to encapsulate drugs into them, and work with clinicians to move them to the bedside. There is a lot of potential in nanotechnology. If the particles can bring a drug to the site of a metastatic disease, people won't feel as many side effects, and it could be a more-effective therapy.

I came from a physical chemistry background. Working with engineers, I was able to learn about optical properties of nanotubes and how we can make sensors out of them. I was able to come to Memorial Sloan Kettering and apply that in a very different and new way.

Nanomaterials are really exciting because at a very small scale, they have very different and exciting properties — like, carbon nanotubes can give off light that can penetrate biological materials like skin, and they can be used to make sensors. So our nanosensors can detect molecules in real time inside of living tissues — and inside of living cells — in animals.

Memorial Sloan Kettering has a critical mass of nanotechnologists who are applying nanomaterials to treat patient diseases and to understand the cancer biology. I'm surrounded by people who have biological and clinical problems to solve.

Coming to Memorial Sloan Kettering afforded me the ability to recruit a team with very different fields of expertise. I found a polymer chemist at the top of her field, making a very rare type of material; an engineer who understands nanomaterials; a pharmacology student who understands

the biological interactions of drugs; and a physicist who builds fluorescence microscopes.

Members of the lab are working together very closely because each one has his or her own area of expertise, and together they are a lot more than the sum of their parts. What's really rewarding is to see them all interact and see what really unique things they are able to come up with. Together we are able to make technologies do things that no one else can in the world, and that's really exciting.

What I really love about my job is that I can do what I enjoy and get into the details and technical issues of my science, but then I can go home realizing that I've done something that might improve human lives.

---