# Mass General Research Institute Blog

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## Postdoc Profile: Nabi M. Nurunnabi, PhD

*on* MARCH 16, 2018 *in* MASS GENERAL RESEARCH, POSTDOC AND GRADUATE STUDENT PROFILES *with* NO COMMENTS

*Md "Nabi" Nurunnabi, PhD, is a postdoctoral research fellow at the Massachusetts General Hospital Center for Systems Biology (CSB) and the Cardiovascular Research Center (CVRC). He is also Chair of MGH Postdoc Association (MGPA).*

*He is biomedical scientist with education and training in both academia and industry as pharmacist, chemist, and bioengineer. He is working on the design and development of target-specific therapeutic approaches for various diseases such as cancer, diabetes, fibrosis, and cardiovascular (stroke and myocardial infarction) along with immunology.*

*He is working in Jason McCarthy's group in the Center for Systems Biology at Massachusetts General Hospital.*

*This interview was conducted by Mojtaba Moharrer, PhD, a communications intern with the Mass General Research Institute.*

# What is your field of research?

We call our field of research nanomedicine. We use nanotechnology, or a nanoengineering approach, to design and develop targeted therapeutic delivery systems.

In most cases, the conventional method of therapeutic delivery (such as administering a drug orally or intravenously) is not targeted. As a result, the therapeutic molecule is randomly distributed throughout the body by the circulatory system and can localize in any part of the body—not necessarily where you want it to.

This can both increase the cost of treatment and the potential for toxicity, because you have to give the patient a higher dose to get required therapeutic effect.

Our approach is to actively direct the therapeutics (small molecules or large biologics) to specific target sites in the body. We also tag therapeutics with imaging agents so we can detect and monitor the location of the therapeutics after administration.

We are also using nanotechnology for disease detection and diagnosis. Early detection and diagnosis helps to reduce treatment costs and increase survival rates, especially with a disease like cancer.

## What research projects are you working on?

On the diagnostic side, I have been working to develop a single nano-probe for non-invasively detecting cancer at earlier stages than traditional screening and diagnostic tools.

For targeted therapeutics, I have been searching for convenient and unique materials that will be stable, ultra-small (within few nanometers), biocompatible and cost-effective.

Part of my goal is to translate the small or large molecular therapeutics for oral delivery, as the oral dosage form has a large market that is of great interest to biopharmaceutical companies.

In this regard, I have developed a platform technology that is highly feasible for oral delivery of anticancer drugs. I have also developed technology that can be used for oral delivery of large molecules such as Glucagon-Like Peptide 1 (GLP-1) and antigen (PR8), which are highly effective for diabetes therapy and immunology, respectively. Both technologies have been patented and have generated interest from industry.

The advantages of these delivery systems is that they shield the

therapeutics and protect them from harsh environment of stomach, enhance absorption through small intestinal membrane and deliver the therapeutic to the site of action.

They are also helpful for controlling the release profile of the therapeutics to reduce dosage frequency.

My current research focuses on imaging and treatment of cardiovascular disease and fibrosis. Fibrosis is a disease caused by cell inflammation, which results in the formation of collagen (also known as fibrin) on the extracellular matrix.

Chemotherapy treatments can trigger fibrosis in the cells that line the blood vessels and coronary arteries. Secretions of excess collagen from these cells can cause a complete or partial blockage of the vessel or artery, which can in turn cause hypertension and/or cardiac arrest.

We are trying to develop a nano-probe composed of therapeutic molecule, targeting peptide, and imaging contrast agent for simultaneous diagnosis and treatment of the fibrosis.

We are also developing a particulate tissue plasminogen delivery system that is designed to target and bind to the blood clot and destroy it *in vivo*. This approach could help prevent the hemorrhaging and nonspecific toxicity that can result from conventional plasminogen-mediated stroke therapy.

## What are your hobbies outside of the lab?

I would say reading. I try to read everything that interests me, not just academic books or research articles. I like to spend the rest of my time with family, visiting zoos and gardens or walking together.

I really enjoy chatting with friends and colleagues. I try not to miss any opportunity to make new friends. Who knows? Anyone that I meet could be a potential research collaborator in the future.

I always carry the book “The Magic of Thinking Big” with me and have been reading it again and again since 2013. I read couple of pages when I feel a lack of motivation or inspiration.

## What have been the most valuable academic and non-academic lessons you learned during your postdoctoral fellowship?

Academic lesson: Actively seek out collaborators who have expertise in areas that you don’t. Non-academic lesson: Be expressive, open for networking and idea sharing.

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