Almutairi lab publishes on breakthrough polymeric material for drug delivery

Dr. Adah Almutairi's group recently created a polymer that can break down into small molecules in response to low power near infrared light. Because this form of light can safely penetrate several centimeters deep into tissues, encapsulating or enmeshing drugs or other biologically active molecules in this breakthrough material would allow researchers or clinicians to noninvasively control the time and location of their delivery.

No other polymer with this capability has yet been designed. The resulting publication, whose lead authors were postdocs Nadia Fomina and Cathryn McFearin, was featured on the cover of the journal *Macromolecules.* Because the work is so exciting, it has received considerable media attention from biotech publications and was covered in an article on ScienceNOW.

While most targeted delivery systems require understanding of how diseased tissue differs from healthy tissue on a molecular level, a light-degradable material would allow delivery of treatment for any disease for which its location can be determined. This material could also be useful as a research tool, as it can diffuse throughout tissues or organisms as they develop, allowing uniform, noninvasive delivery of drugs, proteins, or siRNAs at desired time points without genetic manipulation.

Because near infrared light is such a useful potential remote trigger for drug delivery, other types of delivery vehicles that respond to it have been developed. However, these assemblies require relatively high power irradiation, which is not as safe as the stimulus to which Almutairi's polymer is sensitive, and release their contents by disassembling rather than breaking down into small molecules that can be easily cleared from the body.

Dr. Almutairi's group is currently working on developing polymers with even greater sensitivity to infrared and with different chemical properties to allow a wider variety of formulations.