New way of viewing cells could lead to easier routes for drug manufacture

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Research by a Michigan State University chemist could eventually lead to a quicker and easier way of developing protein-based drugs that are key to treating a number of diseases, including cancer, diabetes and hepatitis.

Proteins used in drug manufacture and research often are made within genetically modified *Escherichia coli*, a one-cell bacteria. That protein tends to collect into what scientists call inclusion bodies. Those hard-to-separate clumps render up to 95 percent of the protein unusable, according to associate chemistry professor David P. Weliky.

Some can be recovered by breaking down the protein to separate it, but because protein structure determines its function, another step must be added to "refold" it into its original configuration.

Weliky and colleagues took a closer look at the structure of the proteins that make up these inclusion bodies. Learning what makes them stick together might yield some clues as to how to separate them, he said, and that could make the manufacturing process more efficient.

Instead of employing more commonly used infrared spectroscopy to look at dehydrated samples, the researchers used nuclear magnetic resonance spectroscopy using whole cells. That technology analyzes the magnetic properties of an atom's nucleus.

While best known as medical diagnostic imaging technology, Weliky and

colleagues view NMR as a powerful approach to analyzing biological molecules, including bacterial inclusion bodies. Because the inclusion body protein appeared to be predominantly folded rather than unfolded, it might be possible to extract protein without separating and then refolding, Weliky said.

"This study highlights our ability to probe the molecular structure of a single protein in whole cells and to apply advanced analytical and biochemical methods to a problem of general significance in biotechnology," Weliky said.

Source: Michigan State University