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Educational Level *	Other
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College *	College of Medicine
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Title of Research *	UTILIZING 3DS MAX DESIGN PROGRAMS TO MODEL MUTATION MEDIATED ACTIN DYSFUNCTION
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**Introduction & Purpose \***

Effective communication of the basic mechanisms of disease can be challenging. We sought to improve the exchange of ideas regarding the basic mechanisms of disease using visual art techniques. Our scientific focus concentrates on the biochemical effects of mutations in the gene that encodes  $\alpha$ -smooth muscle actin, which lead to a range of cardiovascular diseases. Our recent studies demonstrate that the actin mutation R256H causes misregulation of by the actin binding-protein formin. Formin normally facilitates actin polymerization but, remarkably, this mutation leads to inhibition of polymerization by formin due to changes in filament conformation. Conveying the normal and abnormal interactions between actin and its regulatory proteins to the varied scientific disciplines interested in cardiovascular disease is difficult.

**Experimental Design \***

To improve exchange of ideas, we applied visual arts techniques to depict our biochemical findings. 3DS Max Design is a software program that has integrated 3D modeling, animation, rendering and compositing tools. The program was utilized to create and animate actin polymers in 3D shape. The crystal structure of actin is too complex and organic for the software to render in 3D shape.

**Results \***

The protein structures were simplified to familiar but relevant geometric forms to demonstrate relationships between actin and formin. Difficulties rendering protein movement in 3D plane were resolved by grouping proteins together into one object. Distances and angles between structures were carefully calculated to produce synchronized rotation of the actin polymers.

**Conclusions \***

3D modeling can effectively simulate polymerization kinetics to readily convey biochemical data. Improved visual display of protein biochemistry can lead to improved patient education and more efficient communication of significant scientific results between researchers from varied disciplines. In an ever-advancing world of technology, incorporation of artistic software such as 3DS Max Design into data presentation can improve research communication and education.