



Enterprising Biomedical Technology



## Cardiology

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### A Computerized Automatic Pressure Sensor and Inflator Device (CAPSID)

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#### Background

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Coronary heart disease (CHD) and cardiovascular disease (CVD) rank as some of the most serious, time-consuming, life-threatening and costly medical problems around the world today. Coronary angioplasty has revolutionized the treatment of these ailments, such as ischemic heart disease, allowing prompt relief of angina pectoris by dilating the narrowed coronaries.

In spite of more than 25 years of experience, balloon inflation is still a manual, operator-dependant technique with different empiric inflation protocols regarding the number and direction, as well as the rate and level, of inflation pressure. Inflation pressure that is too low may not sufficiently dilate the coronary stenosis, resulting in early recoil, whereas inflation pressure that is too high increases the extent and severity of traumatic damage to the vessel wall, which can cause acute complications such as dissections, thrombotic reocclusions and late complications such as restenosis – the major unresolved drawback of angioplasty. Prolonged inflation duration induces strong ischemic pain and hemodynamic or arrhythmic disturbances.

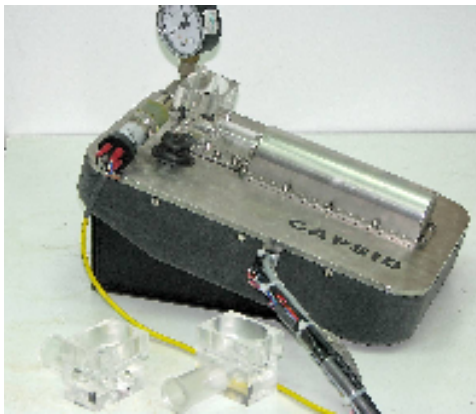
#### Market

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Cardiovascular disease is the largest life threatening disease in the United States. In 2003, about 71 million people were affected by cardiovascular diseases. Coronary artery disease represents the leading cause of death in the United States, accounting for more than 870,000 deaths each year. Angioplasty plays an important role in addressing solutions for coronary artery and peripheral vascular diseases. About 13 million people have been affected by coronary artery disease and about 8 to 12 million are affected by peripheral vascular disease in the United States.

### **The Innovation**

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Since trauma to the vessel wall is the major determinant of late restenosis and no therapy to reduce it has yet been proven effective in humans, it was our aim to develop a new, less traumatic inflation protocol using the Computerized Automatic Pressure Sensor and Inflator Device (CAPSID). The inflation protocol is accurately controlled by a computer that activates a stepper motor that rotates the pump inflator according to the pre-defined protocol that may be changed by the operating physician.

CAPSID is employable for **optimal stent deployment** in angioplasty procedures. Studies using intravascular ultrasound (IVUS) performed during stent deployment have shown that despite a good angiographic appearance of complete stent expansion, stents are often inadequately deployed by conventional angioplasty with poor apposition of stent struts to the arterial wall. This predisposes to conditions of thrombosis or in-stent restenosis. Optimal stenting requires complete stent expansion with minimal trauma to the arterial wall.

CAPSID is also employable for **improved balloon angioplasty** – with and without stent.

CAPSID achieves the following goals for coronary angioplasty procedures:

1. A safer, less painful procedure with fewer complications, less dissections, AMI and ER visits.

2. Less need for stenting and for revascularization and less restenosis in comparison with standard angioplasty.
3. Optimal stent deployment.
4. An ideal platform for future robotic angioplasty.

## Contact

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