**Presentation. Artificial Heart.**

Good morning everyone. My today’s presentation is about artificial heart. After my presentation you will have known about modern developments in artificial heart and problems they face. This won’t take long - less than 10 minutes. And you will be able to ask your question at the end. Let's get going!

First of all, I would like to make a brief outline of what I am going to tell. I'll start with a quick overview of the problem of the artificial heart in general. Then I'll tell you a few facts about the old developments. Following that, I'll show you several modern devices and underline their problems. And at the end I will make a conclusion and say a few words about the future of artificial heart.

So, let's start with the problem overview.

**Problem overview**
Cardiovascular disease is the main cause of death in the United States, Canada, UK, Ireland, and Europe. It accounts for more than 40% of total deaths in these countries. Many of these deaths are due to heart failure. Heart failure affects approximately five million Americans with more than half a million new cases diagnosed annually. There is no doubt that cardiac transplantation is the only effective treatment for now. The one-year survival rate is more than 80% and the 10-year survival rate is close to 50% for transplantation. Even though using artificial heart and left ventricular assist devices is less efficient and safe, we might as well use them, simply because we have a severe lack of donor organs.

**The first developments**
The first artificial heart implant was carried out by Dr. Denton Cooley in Houston, Texas, in a 47-year-old man with intractable heart failure using the Liotta artificial heart developed by Domingo Liotta. This artificial heart was based upon the laboratory work of Dr. Michael DeBakey. The electric total artificial heart was designed for permanent use and was completely implantable. Pneumatic total artificial hearts have not proved to be successful in small group studies. The Jarvik-7-100 artificial heart, a pneumatic system developed by the physician-engineer, Robert Jarvik, was tested in four patients as a permanent implant. All four patients died because of infectious, hematologic, and thromboembolic complications. One patient lived for 20 months. This device was first use by Dr. William DeVries who implanted the device in Barney Clarke in 1982.

From 1970 to the present much investigational work has been done in the development of left ventricular assist devices as opposed to the development of a total artificial heart. And this setback has delayed the development of the true total artificial heart for a while.

**Modern developments**
Several devices of artificial heart are available now and undergoing clinical testing. These are: SynCardia, LionHeart and AbioCor. Have a look at the photos on the slide. All these devices have common problems:
Engineers are working on these problems and I hope in the future we have a reliable, convenient and, what is the most important, transplantation compatible total artificial heart.

The situation is better with left ventricular assist devices, which are implanted only in patients who are eligible for cardiac transplantation. These devices are used as bridges to transplantation and not intended for permanent usage. There are three left ventricular assist devices presently available: Thoratec, the HeartMate, and Novacor.

According to study conducted by Kaplan and Maier, the device caused a significant reduction in risk of death as compared with the medical therapy group. Figure on the slide shows the rates of survival. The study clearly shows that the device can prolong life beyond optimal medical therapy in desperately ill New York Heart Association class IV patients, but only for 6 months.

Let's summarise all key points of my presentation and make a conclusion.

- The first total artificial heart: Dr. Denton Cooley - 1969
- Today's models are not perfect and they face common problems
  - medical complications
  - inconvenience
  - instability
- LVA devices help to prolong life
- Situation can be improved with the help of:
  - nano-technology
  - genetic engineering
  - bio-technology

That is all I wanted to tell. Thank you very much for your attention. I hope you enjoyed my presentation. Feel free to ask questions.