

# THE FUTURE OF ARTIFICIAL ORGANS AND OF MANKIND

*Artificial Kidneys*: At the beginning of World War II, in the Netherlands, I purchased cellophane tubing (artificial sausage skin) to make artificial kidneys. During the war, the first patients were treated, but in 1945, one patient's life was saved with the artificial kidney. I gave artificial kidneys to hospitals in London, England; New York City and Montreal, Canada. With these artificial kidneys, it was proven that people other than the Dutch, could also be treated with hemodialysis.

We are still making small, wearable artificial kidneys so that some of the 250,000 people who are now sustained by dialysis worldwide, should be able to travel and have vacations. Around 1960 when there were not enough artificial kidneys, life and death committees were set up in the United States to select the few that could be treated. Presently, with 3.6 billion dollars spent on end stage renal disease in the United States, this problem is raising its ugly head again under another name—"Cost Containment."

If we do not have enough funds to treat our fellow citizens in need, it is because we are spending too much on defense. Three hundred and twenty billion dollars have been requested for defense in 1986 while they are predicting a deficit of one hundred and eighty billion dollars. By diverting money from social programs, we may be cruel, but by diverting money from research for science and industry, to research in defense, the increase in industrial productivity in the United States, will fall far below that of other countries, particularly as compared to Japan.

*Heart-Lung Machines and Pump Oxygenators*: It could be clearly seen that blue blood going through the artificial kidney, became red. Obviously, it took up oxygen. This indicated the way to make membrane oxygenators. We pulled the cellophane tubing out of our twin coil artificial kidneys and put in polyethylene membranes. Presently, 120,000 people are treated in the United States per

year with open heart surgery, using heart-lung machines. One-half of these are treated with membrane oxygenators.

Oxygenators can also save a number of people from pulmonary insufficiency. If a few nuclear bombs manage to hit our cities, fifty thousand people will die from scorched lungs. However, under those conditions no one will be interested in the use of artificial lungs.

*Nuclear Winter*: Those who survive will desperately try to leave the cities, but outside, they will find a nuclear winter with dark skies, low temperatures, dead crops and burning forests. We cannot defend ourselves; the Russians cannot defend themselves. There is nowhere to hide. Yet, we continue to produce 8,000 nuclear warheads every day. *Why?*

*Artificial Heart*: In 1957, Dr. Tet Akutsu and I made the first artificial heart in the Western World. In the near future, the artificial heart will be used mainly as a bridge to heart transplantation, but there will never be enough donor hearts to fulfill the needs. There will be 35,000 heart replacements per year in the United States alone. Of course, this is a small amount, compared to the twenty million Russians and more than two million Japanese who were killed in World War II.

*Nuclear Fire Power*: The total fire power in World War II, including the bombs dropped on Hiroshima and Nagasaki, was three megatons. The United States and the Soviet Union each have a destructive power of 18,000 megatons which is six thousand times the total destructive power of World War II. One Trident submarine has a destructive power of 24 megatons, equaling eight times the destructive power of World War II—enough to destroy every major city in the Northern Hemisphere. Yet, the United States is planning to build 9,000 more nuclear warheads before 1990.

*Artificial Eye*: The Artificial Eye makes it possible for blind people to see silvery points of light by direct stimulation of the visual cortex of the brain, but it will not be available

for many years.

*Artificial Ear* : The Artificial Ear has now advanced to the point where a number of totally deaf people can have a near normal conversation if they can see the speaker's face, and many of them can communicate over the telephone.

*Communication for Peace* : A superb communication system was demonstrated by the space bridge with the simultaneous participation of six World leaders—Alfonso from Argentina, Gandhi from India, de la Madrid from Mexico, Nyerere from Tanzania, Palme from Sweden and Papandreu from Greece—when they received The Beyond War Award. Seven satellites were used simultaneously. This type of communication should be used to establish nuclear risk reduction centers—to be set up in Washington, D.C.; Moscow, Russia; China and Japan so that accidental firing can be explained, and misinterpretation of wrong information can be avoided.

*Artificial Pancreas* : We do not have a true artificial pancreas, but we can administer insulin via the SPAD (Subcutaneous Peritoneal Access Device) into the peritoneal cavity, from where it will go via the portal veins to the liver. This is where insulin should be delivered. Juvenile diabetics who are difficult to regulate, can be much improved. I believe we have the only patients in the world with beginning renal failure on the basis of diabetic nephropathy where the nephropathy has either been halted or even improved. We believe that many of the dire complications of juvenile diabetes can be delayed or averted. During World War II, I had a ward full of diabetic patients maintained on a starvation diet because we did not have enough insulin. Indeed, they lived until the war was over.

*Worldwide Famine* : In case of a nuclear war, anything like this is hopeless. There will be total destruction of all we have and of all we know. There will be worldwide famine and as I said, Nuclear Winter.

Now is the time for the United States and Russia to reach an agreement. Their destructive powers are about in balance. You can hope for an agreement when you start on almost equal footing, but not when one is far superior. Now is the time!

*Greenhouse Effect* : Although we should all unite against unclear weapons, we probably have to accept nuclear reactors for energy. Japan has 24; thirteen are under construction and seven more are planned. The immense use of fossil fuel leads to acid rain and ozone destruction of forests and crops. This, combined with the cutting of the world's tropical forests and elimination of CO<sub>2</sub> synthesis, will lead to increased CO<sub>2</sub> of the atmosphere and the greenhouse effect. It will trap the heat from the sun under the CO<sub>2</sub> blanket. The polar ice caps will melt. All the coastal plains of Japan will be flooded.

Japan has the second largest Gross National Product in the world—1.2 trillion dollars. Japan has the fastest growing industrial productions in the world. Japan shall be the leader in peaceful use of nuclear energy within the next twenty years.

What good will an artificial heart do us if we are all vaporized?