

## Abstract

Title

# **New strategies for the development of Internal Artificial Organs**

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We have researched for internal artificial organs for these decades. Aggressive trials have been performed to develop artificial kidney, heart, and liver. We are going to look back the history of these efforts, and introduce our present works.

### 1. Artificial liver support

Bioartificial liver support in which living liver tissue substitutes hepatic function is anticipated to be an effective treatment of hepatic failure. We developed a bioreactor filled with hepatocytes immobilized on collagen-coated non-woven polyester fabric, and an original accommodation device of whole liver for extracorporeal perfusion. In our ex vivo perfusion experiments, the best performance was shown by extracorporeal liver perfusion, and the advantages of bioreactor system lay in its easy maintenance after the perfusion treatment was initiated. However, viewing the situation containing social antagonist for zoonosis, bioartificial liver support is still difficult to be adopted in the ordinary clinical therapy to treat hepatic failure patients. It needs great labor and economical cost compared with apheresis therapy as hemodiafiltration in combination with plasmapheresis. Therefore, we developed transgenic pigs that secrete human albumin systemically, which research will lead more practical therapy minimizing economic and medical resource costs. Hemodiafiltration in combination with the administration of cost-effective human albumin and coagulatory factors would be ideal.

### 2. Artificial heart valve

We have researched bioprosthesis collected from miniature swine, which has significant advantage in saving warfarin administration, especially for high-aged patients. Miniature swine bioprosthesis has smaller size than 19 mm in diameter, which are available for pediatric patients or those with small body size. We hope these strategies will greatly contribute to the treatment of patients suffering from severe organ failure, resulting in elevation for human medicine and welfare.