

## Medical science of the future

Stem cell therapy instead of open-heart surgery – Regenerative medicine is opening up completely new perspectives in modern medicine.

### Center of regenerative medicine

Research in cardiac surgery has taken a quantum leap forward in recent decades. For instance, while a defective heart valve used to be equivalent to a death sentence, operating on heart valves is now a routine intervention. In addition to conventional procedures, the range of research today encompasses many innovative topics such as minimally invasive operating tech-

niques, materials science, molecular biology and regenerative medicine. The goal of the Swiss Center for Regenerative Medicine (SCRM) at the University of Zurich is to apply the principles of these technologies to next-generation therapies. It combines the fields of basic biomedical research and clinical research. Current focuses at SCRM are minimally invasive cardiac surgery and therapies using tissue engineering, i.e., in vitro cultivation of tissues and cell clusters with subsequent cell transplantation. One possibility is to harvest the patient's own stem cells from the body and transplant them directly into the

### Requirements

- ▶ Maximum sample safety
- ▶ Minimal risk of contamination
- ▶ Short recovery times for temperature and CO<sub>2</sub> concentration after door opening
- ▶ Uniform temperature distribution in the incubators
- ▶ Absolutely stable parameters within a trial series

### BINDER solution

- ▶ CB incubator with sterilizable CO<sub>2</sub> sensor
- ▶ Standard-compliant hot-air sterilization at 180 °C
- ▶ Low risk of contamination due to minimized surface area with no fixtures in the chamber
- ▶ Homogeneous temperature distribution throughout test specimens
- ▶ Short recovery time after door opening
- ▶ Sterilizable CO<sub>2</sub>-/ humidity sensor guarantees optimum cell growth with stable pH value



▲ Research may only be conducted under the most stringent of safety regulations.

damaged tissue. On the other hand, living tissue, e.g., new heart valves or blood vessels, can be grown from stem cells in the laboratory.

*"The sterilization cycle of BINDER CO<sub>2</sub> incubators conforms precisely to the requirements of the European Pharmacopoeia."*

*Dr. Martin Kayser, Head GMP*

### Center for Clinical Research

The SCRM is part of the Center for Clinical Research and is jointly supported by the University Hospital Zurich and the University of Zurich. The intention of the Center, which opened in 2011, is to be a regional and national authority in the field of clinical applications of regenerative therapies. There were several hurdles to be overcome before the Center opened. The European regulatory authority granted authorization for research only provided that rigorous safety requirements were met. Since no laboratory in Zurich satisfied these requirements, the Center for Regenerative Medicine was constructed at great expense. "A highly specialized infrastructure is the most important requirement for the successful translation of research results into clinical applications in the fields of tissue engineering and regenerative therapies," explains Dr. Martin Kayser, Head GMP at the Center for Regenerative Medicine. Working in a



▲ A highly specialized infrastructure is the most important prerequisite

sterile environment is just as important. Researchers enter the facility through a safety and climate airlock. The five clean rooms, the actual laboratories, provide a sterile environment.

### Low risk of contamination due to heat-sterilization

CO<sub>2</sub> incubators manufactured by BINDER are used in the process of stem cell propagation. The incubators can be automatically sterilized virtually overnight with hot air. BINDER's fixed, heat-sterilizable CO<sub>2</sub> sensor is unique. "The sterilization cycle of BINDER CO<sub>2</sub> incubators conforms precisely to the requirements of the European

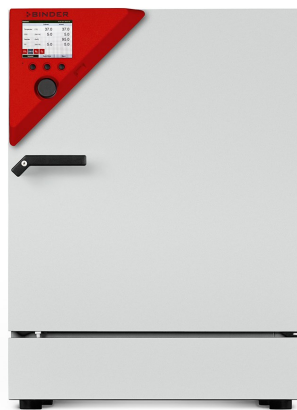
Pharmacopoeia, which means that the risk of contaminating cell cultures is reduced to an absolute minimum," says Kayser. The equipment also has a patented air jacket system, which guarantees optimized cell growth. "The short recovery times for temperature and CO<sub>2</sub> concentration after door opening, and the uniform temperature distribution ensure a high rate of reproducibility of cell propagation. This was another reason we decided on BINDER incubators," says Kayser in closing.

### Advantages

- ▶ Patented chamber design for maximum sample safety
- ▶ Hot-air sterilization at 180 °C
- ▶ Sterilizable CO<sub>2</sub> sensor
- ▶ Unique BINDER technologies (patented air jacket system, controlled condensation, etc.)

### Application

- ▶ Biotechnology
- ▶ Bio-tissue engineering
- ▶ Clinics / university hospitals
- ▶ In vitro fertilization



▲ CO<sub>2</sub> incubator CB 160

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