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## **Ventil: One ventilator can save two lives simultaneously**

Currently, one ventilator means one patient saved. However, two patients at a time can be saved – using an additional device the Ventil, which is the result of a dozen years of research on respiratory system support, conducted at the Nalecz Institute of Biocybernetics and Biomedical Engineering PAS in Warsaw. The device, whose serial production can be rapidly initiated by virtually any medical equipment manufacturer, allows one ventilator to ventilate two patients in different clinical conditions simultaneously.

Ventilators help patients with severe acute respiratory distress which may occur in patients with COVID-19. Their role is to supply the virus-attacked lungs with adequate amounts of air. Bearing in mind the limited number of ventilators, their complexity and high price, during a pandemic there may not be enough machines for all patients. This situation can be significantly improved by Ventil, the result of research on respiratory and cardiovascular support that has been conducted over several years at the Nalecz Institute of Biocybernetics and Biomedical Engineering of the Polish Academy of Sciences (IBBE PAS, [www.ibib.waw.pl](http://www.ibib.waw.pl)) in Warsaw. When connected to a ventilator, Ventil makes it possible to ventilate not one, but two patients at the same time, even if both are in a state of severe respiratory distress.

*“Ventil is not a ventilator. It is a precisely controlled divider, connected to a ventilator with an appropriate power surplus – that is, in practice, to any on-site hospital ventilator. The device allows the doctor to watch over the course of ventilation in two patients simultaneously. Its design is much simpler than the ventilator itself, it is also much cheaper and easy to manufacture,”* says Prof. Piotr Ladyzynski, deputy director of IBBE PAS and he emphasizes: *“Ventil is our invention, developed over a long period of time, with patented solutions. We have the full technical documentation. We can make the licence for the production of these devices available immediately to any interested manufacturers from around the world so that they can quickly start mass production wherever they are.”*

Ventil was originally developed for the independent mechanical ventilation of each lung in the same patient.

*“Classic ventilators deliver air identically to both lungs. However, in many patients their lung function is not symmetrical. Ventil was created so that each lung can be ventilated independently and in a mechanically different way, optimizing the course of treatment. Used in this manner, the device has already had many years of tests carried out in intensive care units. This application was reported in several scientific publications,”* explains Prof. Marek Darowski, head of the scientific team in which Ventil was created.

In the realities of a pandemic, what is of particular importance is that Ventil can help not one, but two patients at once by supporting each person's respiration independently. Advantage of Ventil, considering application in two patients, is that the air volume pumped into each patient is independently controlled and monitored.

On the basis of the know-how provided by IBBE PAS, the technical documentation of the Ventil medical device was developed at the Lukaszewicz Research Network – Institute of Medical Technology and Equipment (ITAM) in Zabrze and the production of the first batch of 100 devices began.

*“The same sort of production could be rapidly initiated in any company dealing in the production of medical equipment and, at a significantly reduced costs, effectively double the amount of ventilators operating in a given area,”* notes Dr. Janusz Wrobel, director of Lukaszewicz-ITAM.

The super-fast pace of commencing the serial production of Ventil devices in Lukaszewicz-ITAM was possible thanks to the financial support of IBBE PAS by the Ministry of Science and Higher Education.

Nalecz Institute of Biocybernetics and Biomedical Engineering, Polish Academy of Sciences in Warsaw is the largest research center in the field of biomedical engineering in Poland. The main research areas of the Institute are biomeasurements combined with computer data processing and analysis for the purpose of medical diagnosis and support and replacement of lost body functions by using technical and hybrid tools, including physical and mathematical models of the selected organs and physiological systems and their computer simulation. The results of the research works, in the form of original diagnostic systems and therapeutic methods, have been incorporated into clinical practice in a number of Polish medical centers.

The Łukaszewicz Research Network – Institute of Medical Technology and Equipment in Zabrze is the leading domestic research and development institution operating in the field of medical technology. The Institute developed a significant amount of original and innovative solutions introduced into industrial production and successfully used in health care institutions. The mission of the Institute is developing modern equipment for diagnostics, therapy and medical rehabilitation in cooperation with other scientific institutions, organizations and industry dealing with medical technology.

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#### **LINKS:**

<http://www.ibib.waw.pl/>  
The Nalecz Institute of Biocybernetics and Biomedical Engineering website.

<http://itam.zabrze.pl>  
The Łukaszewicz Research Network – Institute of Medical Technology and Equipment in Zabrze.

#### **IMAGES:**

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Following connection to a ventilator, Ventil can simultaneously ventilate two patients in different clinical conditions. (Source: IBBE PAS, [www.ibib.waw.pl](http://www.ibib.waw.pl), fot. G. Krzyzewski)

**IBIB200330b\_fot02s.jpg** HR: [http://press.ibib.waw.pl/news/2020/IBIB200330b\\_fot02.jpg](http://press.ibib.waw.pl/news/2020/IBIB200330b_fot02.jpg)  
Prof. Marek Darowski demonstrates the Ventil apparatus. (source: IBBE PAS, [www.ibib.waw.pl](http://www.ibib.waw.pl), fot. G. Krzyzewski)