

BABYBE GmbH: Premature babies in contact with mum around the clock

It used to be believed that premature babies needed as much rest as possible. However, studies have since shown that this is not the case at all. According to these studies, the brains of premature babies need to be stimulated 24 hours a day, ideally close to the mother, to ensure healthy development. The Stuttgart-based start-up BABYBE GmbH has developed a special gel mattress that enables babies to perceive their mother's heartbeat and voice whilst inside the incubator. The system is already being used in several clinics around the world.

In Germany and other industrialised countries, around nine percent of babies are born prematurely; in many developing countries the rate exceeds ten percent - and this number is rising.¹ A premature baby is defined as one born before the 37th week of pregnancy. The reasons are often unknown, but can range from infections, late pregnancy or chronic illness to the well-known factors such as alcohol and smoking.

Thanks to modern neonatal intensive care, the survival rate of premature babies has risen sharply in recent years, and more than 80 percent of very small infants weighing less than 1,000 grams survive when treated in well-equipped centres. However, some preterm babies will later exhibit behavioural problems and motor or cognitive limitations. Although attempts are being made to counteract this by providing the children with skin-to-skin contact with their mothers as often as possible and, ideally, ensuring that they are breast-fed (referred to as kangaroo mother care (KMC)), this is extremely hard to achieve and is often only possible for a few hours a day.



A premature baby in an incubator on a bionic gel mattress, which is gently rocked through an input of air.
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As secure as if baby was lying on mum's chest

This gave two young researchers the idea to look for a method that enables premature babies to have 24/7 contact with their mother and thus a development environment that is as normal as possible. They successfully turned their idea into reality. Raphael Lang and Camilo Anabalón, who founded a start-up company called BABYBE in Stuttgart in 2013, have developed a bionic gel mattress in cooperation with neonatologists. This gel mattress helps preterm babies in the incubator or crib to feel as secure as they would on their mother's chest. "The babies can even feel the heartbeat and lung motions of their mother, just as if they were lying directly on their mother's stomach," said Lang describing the system. "The gel mattress can also reproduce the mother's voice."

In addition to the bionic mattress, the BABYBE® system has two more components: a turtle-shaped module weighing around 1.5 kilograms - called the Turtle - that the mother holds close to her body so that heartbeat or breathing and speech sounds and lung movements can be transferred into the incubator. This works at a distance of up to 30 metres. A control module attached to the outside of the incubator transmits the signals.

The brain develops until the last week of pregnancy



The BABYBE® system helps a premature baby feel very close to its mother around the clock even in the incubator.
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"Studies have shown that preterm babies need stimulation 24 hours a day. During this time, important transformation phases are still taking place in the womb," says Lang. "Previously, people thought that the brain was practically finished and premature babies needed a lot of rest two months before the planned birth date. This is not true and is associated with problems such as respiratory failure, bonding problems or delayed speech development. This is why children are now taken out of the incubator as often as possible and put on their mother's chest. Experience has shown that this is difficult to do 24/7 as the mums may also have other children and also need sleep

themselves, of course."

The BABYBE® system is used when the mother is not available. The premature baby is nevertheless close to the mother thanks to noises it is familiar with, e.g. the mother's heartbeat, her breathing and speech sounds, and therefore feels completely at home in an environment that mimics its mother's womb. "We have also developed a feature for times when the baby's mother is at home. "Using their smartphone, parents can transfer maternal heart sounds to the child, and read baby a bedtime story."

Positive effect on weight gain and respiratory rhythm

BABYBE® therapy has already proven successful: a first pilot study² carried out in Chile has shown that the system has an excellent effect on the babies' respiratory rates, reduces the babies' stress and has a positive effect on weight gain. Another large-scale study is currently underway in collaboration with clinics throughout Germany. The study aims to reveal the effects of BABYBE® in larger patient numbers and under different conditions. "As we have seen, an investigation of this kind is also very important for scientific exchange between clinics," says Lang. "In Germany, there is still no general rule on how to deal with premature babies. In fact, everyone does more or less their own thing, and therapies can be quite different. The study can also help to set standards for the best treatment of premature babies in the future."

Devices are already in use worldwide

The two inventors, mechatronics engineer Lang and designer Anabalon, started their development immediately after finishing university: "We had some support from the Stuttgart Olga Hospital, and started out mostly with our own money, working in workshops at the Art Academy. Later on, the head of the Fraunhofer Institute, Dr. Alexander Verl, who was genuinely enthusiastic about our idea, provided us with free office space and infrastructure," says the company founder.

BABYBE GmbH now has five employees, and around 30 certified devices are in use in clinics worldwide. The plan is to add at least 20 more by the end of 2018. The key goal is for all health insurance companies to include the system in their health insurance catalogues, so that it will be reimbursed: "The Techniker Krankenkasse health insurance company is the pioneer par excellence - it sponsors and subsidises the systems," says Lang. "One system costs about 15,000 euros, and can be used for ten years. If you can treat ten children a year with it, then you save the 2,000 to 3,000 euros that a premature baby costs more per day than a full-term baby. The



devices really cost peanuts in the overall scheme of things. It's also important to remember that premature babies often start school later than their peers because of poorer language development. The cost of aftercare and learning therapy is usually very high."

With the aid of the Turtle, the mother's breath, heart and speech sounds can be transmitted directly to the incubator several metres away, so that the premature baby is surrounded by a familiar soundscape.
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Research for premature babies continues

The polyurethane gel mattresses are produced by Technogel Germany GmbH in Berlingerode, Thuringia as a special high-tech product according to the FDA and Oeko-Tex-100 standard. The complete system is manufactured by Sasse Elektronik near Nuremberg. BABYBE GmbH sells the product. "But of course we definitely want to continue to grow," says the engineer. In addition, the start-up, together with its network of 30 European and South American neonatal clinics, continues to be involved in research. So, when asked if further products are planned in the future, the company founder replies: "That is still a bit of a secret at the moment."

References:

1 WHO: "Preterm Birth", 19th February 2018

2 Feasibility of use of emotional prosthesis BABYBE® in premature babies hospitalized at San Borja Arriaran, 2015

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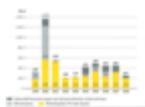
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