How AI helps children with cleft lip and palate



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Leading experts today rely on the support of artificial intelligence, even in the medical treatment of the youngest children. In a joint research project by the University of Basel and ETH Zurich, for example.

Cleft lip and palate are among the most common malformations in newborns, occurring in 1 out of 700 births. In addition to the aesthetic impairment, these malformations also cause problems with breathing and feeding as well as speaking for the children affected. There are many strategies for treatment, with the most common approach involving multi-stage surgical procedures. Treatment of the malformation begins in advance of the operation with the production of an individualised palate plate made of plastic. This plate is inserted as soon as possible after birth, ensuring that the tongue no longer enters the cleft palate and thus this cleft passively reduces in size. This is beneficial for subsequent surgical closure. A palate impression is currently required to make the plate fit accurately, however, it puts the child's breathing at risk.

Gentler treatment thanks to AI

The aim of a project supported by the Botnar Research Centre for Child Health (BRCCH) in Basel is to develop a gentle and simple digital method for measuring the cleft and producing a palate plate, and to make this method accessible to as many children as possible. The project's lead scientists are Andreas Müller, oral and maxillofacial surgeon at the University Hospital Basel, and Barbara Solenthaler, Senior Research Scientist at the Computer Graphics Laboratory of ETH Zurich: "We are fulfilling the BRCCH's vision to develop new, digitally-based treatments for common childhood malformations."

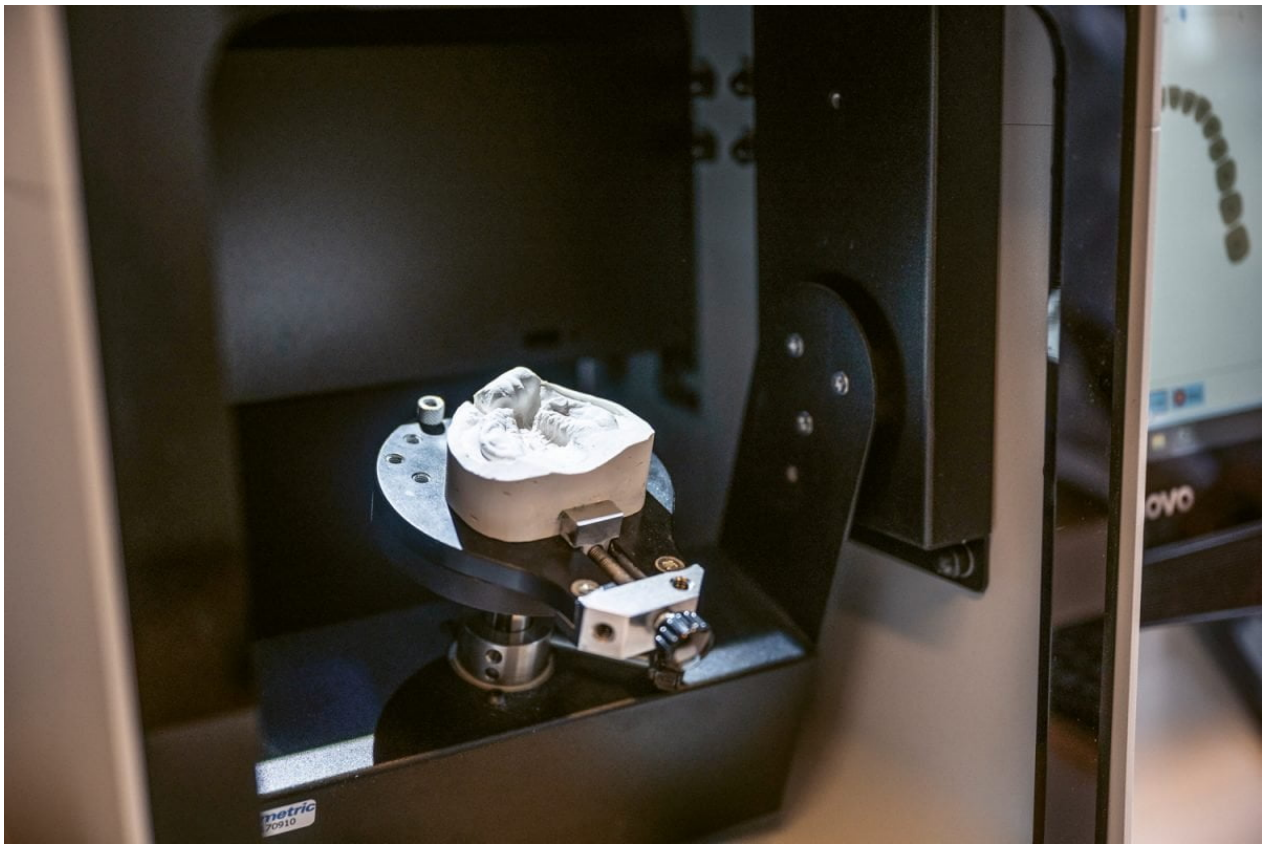
Other participants include Markus Gross, ETH professor and Director of DisneyResearch|Studios, and partners from

clinics in Poland and India.

The novel treatment is made possible by the use of artificial intelligence. In a first step, the researchers are mapping the palates of large numbers of patients by means of images and scans. These datasets are supplemented with scans of existing plaster casts of palates, and this data is evaluated with the aid of AI and used to digitally construct a 3D model: the more datasets that are included, the more accurate the model. In a second step, the aim is to be able to map the individual cleft based on a few smartphone photos. A suitable palate plate will then be calculated automatically, and produced using a 3D printer.

From Basel, Warsaw and India, out into the world

3D printing of palate plates is already in use at the participating clinics in Basel. As many patients as possible worldwide should benefit from the fast and inexpensive digital workflow – initially in Warsaw and in Hyderabad, India. Another advantage of this treatment strategy is that, following palate plate therapy and cleft reduction, palate closure can usually be achieved in just one operation. This leads to fewer treatments, which is a great relief for the affected children and their families.



A plaster cast of a palate impression of a child with a cleft lip and palate is processed in a 3D scanner.
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find out more about the BRCCH

Funded by the Fondation Botnar

The Botnar Research Centre for Child Health (BRCCH), jointly founded by the University of Basel and ETH Zurich, opened in 2019. The research centre combines the competence of the two universities as well as the University Children’s Hospital Basel and the Swiss Tropical and Public Health Institute. The focus is on developing new methods for the benefit of children and young people worldwide. The BRCCH received initial funding of 115 million

Swiss francs from the Basel-based Fondation Botnar. The foundation was established in 2003 by Marcela Botnar to continue her philanthropic commitment and that of her late husband Octav. Their only daughter, Camelia, died in a car accident at the age of 20.

https://ethz-foundation.ch/en/spotlight/uplift_9_brcch/

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