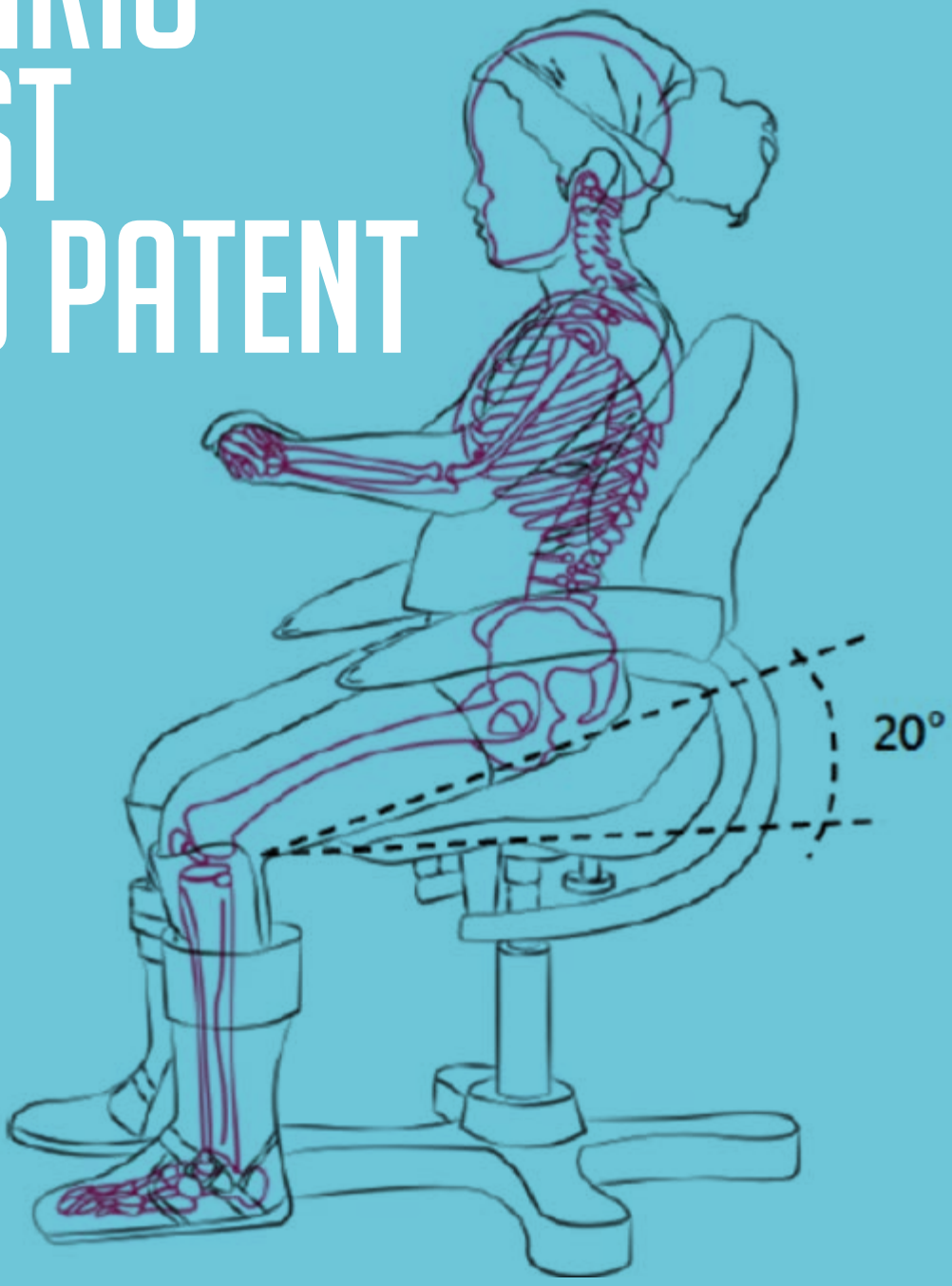
AN INCLUSIVE CHAIR BRINGS EL ROSARIO ITS FIRST SHARED PATENT

Boys and girls with brain and neurological disorders can enjoy improved quality of life by using the Incluchair, an inclusive design developed jointly by the Occupational Therapy Program of the Universidad del Rosario and the Design Program of the Universidad de los Andes.



By Ninfa Sandoval / **Photos by** Leonardo Parra

Focus groups were formed to get ideas for the best design. They included parents and occupational and physical therapists of children with mild to moderate cerebral palsy.

There are no up-to-date statistics in Colombia of current numbers of disabled people, and certainly no recent figures reflecting child disability. According to the Registry for the Localization and Characterization of Persons with Disabilities (compiled by the Colombian national data agency DANE), in 2010 there were 857,132 people with some kind of disability; 761,889 of them had disabilities associated with the nervous system or with moving their body, arms, and legs. Among children from 0-14 years of age, 13,167 had difficulties in changing or maintaining the position of their bodies; 14,194 had trouble using, carrying, or moving objects with their hands, and 38,381 had difficulties walking, running, and jumping.

A joint project by the Occupational Therapy program of the School of Medicine and Health Sciences at the Universidad del Rosario and the Industrial Design program of the Universidad de los Andes undertook the development of the Incluchair, which enables children with cerebral palsy to sit up straight so they can carry out different activities and integrate into social spaces.

"It is hard for children with cerebral palsy and other neurological problems to maintain their posture, to control the position of their heads and hands, and to walk correctly," explains Adriana Ríos, Ph.D., leader of the project and professor of Occupational Therapy at the School of Medicine and Health Sciences at the Universidad del Rosario. This work designing furniture for children with motor difficulties was begun in 2008, with the goal of helping children improve their social participation and their quality of life at home, in school, and in rehabilitation facilities.

THE INCLUCHAIR GAVE CHILDREN A STRAIGHTER POSTURE. THEY EXPERIENCED FEWER MUSCULAR COMPENSATIONS DURING THEIR ACTIVITIES, AND NEEDED LESS TIME TO CARRY OUT TASKS THAT REQUIRED THE USE OF BOTH HANDS

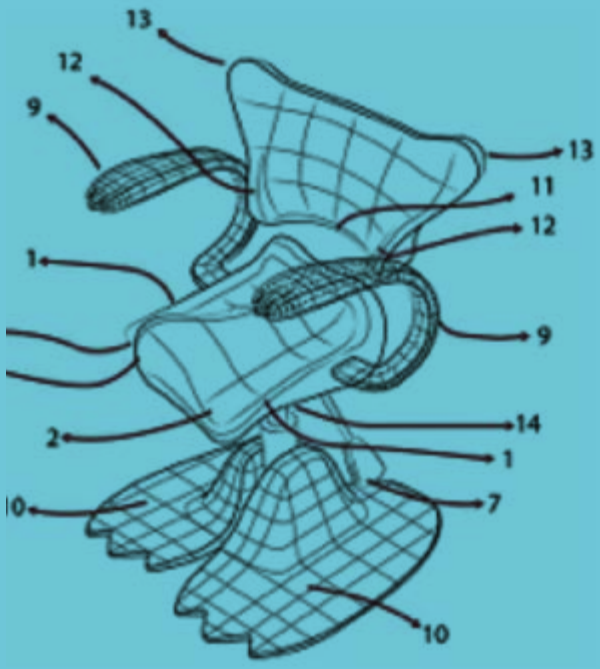
This gave rise to the Incluchair, which is designed for use by children with minor or less severe brain injuries who can move their bodies with assistance or support, but who are not able to maintain a posture that allows them to carry out manual activities, and who are unable to maintain close attention to activities because in normal chairs they slip down and fail to keep upright for activities such as drawing and writing or grasping objects and placing them in containers.

SEARCHING FOR THE SOLUTION

A process of perfecting and testing prototypes of the chair was carried out in collaboration with the Faculty of Industrial Design of the Universidad de los Andes and the participation of researcher and industrial designer Mónica González.

Several models were tried, first with girls and boys with no postural difficulties, until researchers settled on a comfortable and functional model for both sexes.

The research results demonstrated that in sitting positions without good postural support, the children's muscles needed to work harder, and they took longer to carry out twohanded activities.



Focus groups made up of parents and occupational and physical therapists of children with minor to moderate cerebral palsy were used to get ideas for the best design. This allowed researchers to determine the best angle of forward tilt for the back of the chair, which turned out to be 20 degrees. This provides necessary support to the pelvis and its muscles so that children's backs and heads are kept in the most advantageous position for longer periods. At the same time, the curved design at the front of the seat helps keep children from sliding down on it.

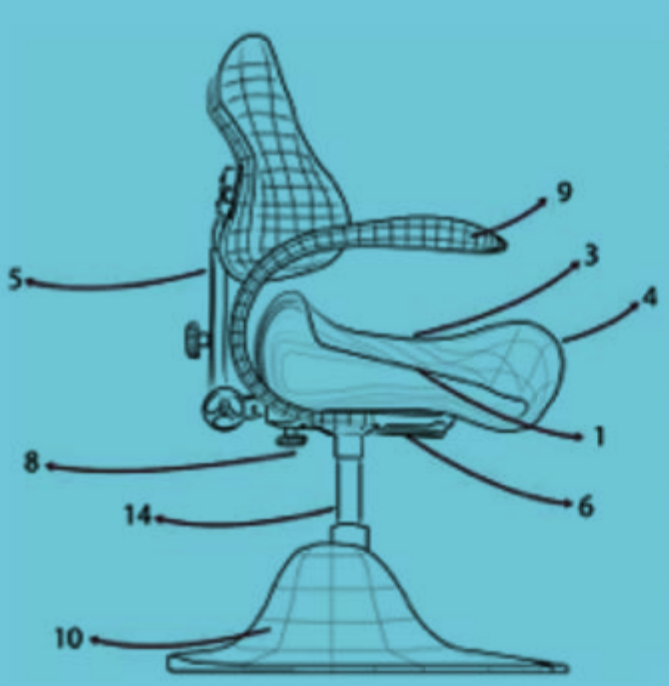
Once the model was ready, researchers recorded the amount of time that 15 children of 4-11 years of age with cerebral palsy needed to carry out several activities.

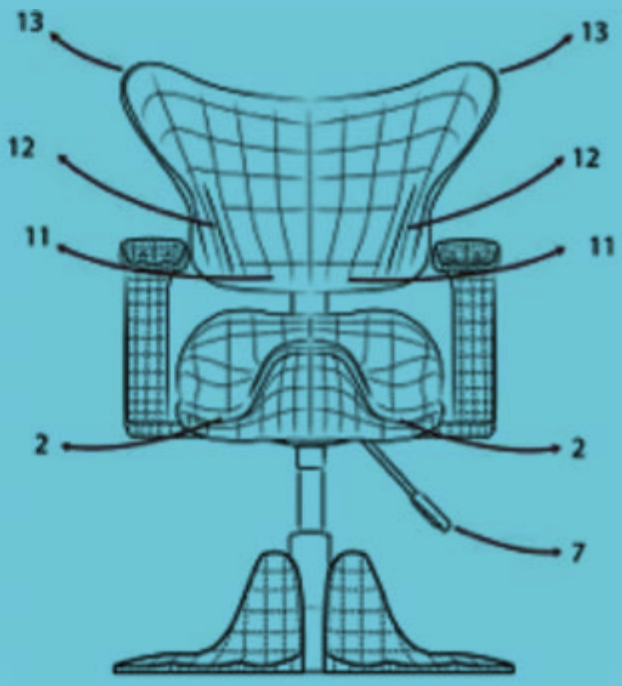
Seated in a school chair, in a chair with a wooden wedge that positioned their hips, and in the Incluchair, the children carried out activities such as visually following an object, grasping a toy, opening a bottle with two hands, moving a toy car from side to side, putting objects into a bottle, and raising an object over their heads.

IN 2011, THIS APPLIED RESEARCH PROJECT IN INCLUSIVE DESIGN, SUPPORTED BY METHODOLOGIES ASSOCIATED WITH BIOMECHANICS AND NEURODEVELOPMENT, WAS GRANTED A PATENT FOR THE INCLUCHAIR BY THE COLOMBIAN SUPERINTENDENCY OF INDUSTRY AND COMMERCE

THE RESULT: MORE UPRIGHT POSTURE

Using surface electromyography (which provides a graphic record of the electrical activity produced by muscles), the activity of muscles in the children's backs, necks, abdomens, and arms was measured to evaluate the effort required to stay seated upright during these activities.





The chair helps children who have minor to moderate cerebral injuries and can get around with help or support but cannot maintain a position that allows them to engage in manual activities.

The results demonstrated that when the children were seated without good postural support and they were unable to stay upright, their muscles had to work harder and they took longer to carry out two-handed activities.

The experiments were conclusive. Children seated in the Incluchair had straighter posture, experienced less muscular compensation during activities, and they took less time to carry out two-handed tasks.

USES OF THE INCLUCHAIR

This solution, dedicated to giving more functional time when seated to children with mild neurological diseases, offers improved quality of life and tools for inclusion and interaction in learning contexts.

The chair can also be of benefit to other children, such as those with Down syndrome, those born prematurely, and those without disabilities but who present problems in their posture or in carrying out activities.

In 2011, this applied research project in inclusive design, supported by methodologies associated with biomechanics and neurodevelopment, was granted a patent for the Incluchair by the Colombian Superintendency of Industry and Commerce.

Its development, as Ríos explains, "allows boys and girls with neurological disorders to take part in society without being stigmatized or discriminated against, to exercise greater autonomy, and to improve their performance in school activities and daily life. In addition, it can be used at home, in school, and in therapeutic spaces."

Sponsorship of this work is needed so designers can generate more prototypes, continue to perfect the chair aesthetically, and put it to use in learning environments.This will allow researchers to gauge impact by carrying out a field study using teachers and children.

Adriana Ríos says that the invention needs sponsorship to develop more prototypes, continue to improve its aesthetic aspects, and put it to use in learning environments. This will allow researchers to study its impact on children in the field.