



CHILD OBESITY

genes are the key

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A growing number of minors are growing up with eating disorders that lead to them suffering from extreme obesity. The School of Medicine and Health Sciences is researching the genetic causes behind this condition.

Since the mid-20th century, obesity has become a global pandemic. With the appearance of processed foods, new technology for conserving meals, and changing middle-class behavior, families not only began to consume more sugar and saturated fats, but also adopted more sedentary lifestyles.

Sadly, it is a problem that seems to have run riot in children, who from an early age give up physical activity for television, and home cooking for the convenience of restaurants and junk food. In fact, a study run by London's Imperial College and the World Health Organization (WHO) calculates that more than 124m children and youngsters worldwide have weight issues.

The WHO study reveals that the number of obese children in the world has multiplied tenfold in the last forty years and, even more worryingly, it states that if present conditions are maintained there will be more obese infants and adolescents around than those who are undernourished.

However, not all obesity is down to an excess of food and calories. Genetic problems also exist, predisposing people to obesity. "If you think about this in evolutionary terms, we are now living in an obesogenic environment that runs contrary to our nature. Our genes are prepared to take energy from our environment because in the past we did not have either fridges or food storage," comments Claudio Mastronardi, Professor of the School of Medicine and Health Sciences, and a member of the Neuroscience Research Group (NEUROS) at the Universidad del Rosario.

Added to this is the fact that in conditions of poverty, food quality is worse. “There are poor sectors that paradoxically end up having obesity problems worse than those found in much richer groups, wherein people have the possibility to choose their types of food,” explains the professor.

It is precisely the School of Medicine and Health Sciences of the Universidad del Rosario—in cooperation with Colombia’s Cardioinfantil Foundation and the Sanitas University Foundation—that is behind research on extreme obesity in children, a search to find genes related to this condition that have still not been identified.

“The idea of the project is to ‘hunt’ the genes of morbid obesity in Colombian children, which would allow us to better understand how the illness is produced, how it develops, and how it can eventually be controlled. These genes may already be known about, or new ones may appear during our research,” explains Carlos Martín Restrepo, geneticist and professor at the School of Medicine and Health Sciences.

The researchers believe this analysis will also help to determine the impact of this problem among the Colombian population.

To begin with, obesity is not just a problem on its own, but is tied in with other issues that place those suffering from them at great risk, such as cardiovascular disease, hypertension, and type 2 diabetes. “It is a very complicated problem and we need to know all about the genetic factors involved in order to combat the pandemic in some way,” argues Mastronardi.

A specific outcome of this project undertaken by the Universidad del Rosario is the identification of a repertoire of gene patents unique to the Colombian population. According to the experts, gene variation is particular to each society, so the causes of the condition can vary from those discovered in the USA, Africa, or Norway, for example.

A PROJECT IN SEVERAL DIFFERENT COUNTRIES

To give the project wings, the University of Rosario has arranged a process to be carried out in three big phases. In the first, researchers use the internet and established social networks to find boys and girls who might have this problem; these can be anywhere in Colombia.

The cases found are filtered to determine which are extreme, and this happens before ‘hunting’ the genes that might be involved in their physical condition. “The Cardioinfantil Foundation and the Sanitas University Foundation, together with other medical institutions, are helping us identify those children whose weight deviates threefold above normal patterns. This makes up less than one percent of early-onset obesity cases,” explains Mauricio Arcos, director of the Institute of Translational Medicine at the Universidad del Rosario.

These most extreme child obesity cases are then submitted to whole-exome analysis (checking the 24,000 human genes in detailed sequencing) or whole-genome sequencing (also checking the additional 80% of DNA that controls gene function). These examinations currently cost from 650 dollars and offer detailed results in just a few days. Thanks to such tests, the project has a high probability of identifying those genes—both known and new—that may cause extreme obesity in sections of the domestic population. “If we find cases of family members with differences between them, we might also find protective factors, meaning elements that protect some people against obesity when they face the same environmental conditions and which give indicators for the creation of personalized treatments,” explains Prof. Restrepo.

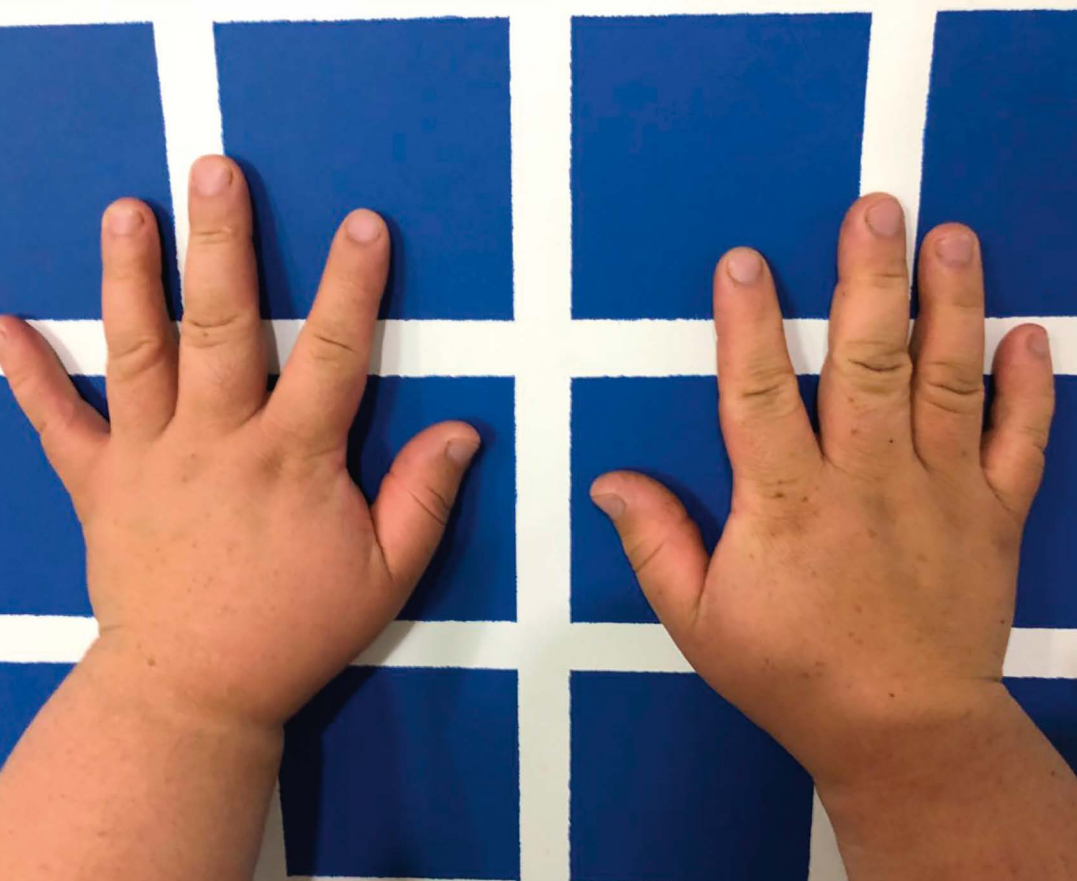
The project has already begun to produce tangible results. For example—in cooperation with colleagues from the Colombian Obesity Foundation (Funcobes) and the University of La Sabana—the researchers found two adolescent sisters who suffered from extreme obesity due to a mutation of the gene that controls leptin production, the hormone that triggers the feeling of satiety.

“These young people already weigh more than 140 kilos. Since they feel no satisfaction while eating food, they consume more food than their organism needs, and this has led to extreme obesity. Thanks to this finding, we are planning to start them on treatments, giving them a leptin substitute,” says Restrepo.

This case is also a clear example of precision medicine, by which the genetic information of the patient is obtained in order to identify the exact cause of what is taking place, to then replace what is lacking and impact on the illness. With this medicine it is possible to get to the root of a problem that up to now was treated according to a generalized approach without obtaining results.

“The way to apply precision medicine is to know who is who by checking the only individuality that makes us different from the next person, and that is our genetic code. Although it seems costly to carry this out, on finding the exact cause of the illnesses, we can considerably reduce treatment costs,” concluded Prof. Arcos.

This project to determine the genetic causes of child obesity is planned for a three-year period. In the first year, researchers carry out searches and gather general data on patients; later, a selection process takes place to pick those who fall into the biggest ranges for being examined. At this stage, the project’s academics are carrying out 100 exome analyses among those children who have just begun to suffer the problems of extreme obesity, and for whom ways of improving their quality of life are now being sought. ■



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From left to right: Carlos Restrepo, Claudio Mastronardi, and Mauricio Arcos Burgos, researchers at the School of Medicine and Health Sciences of the Universidad del Rosario.

