Using maths, researchers seek to improve success in transplants

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Given that 10.5% of patients who receive a transplant reject the new organ, researchers at the Center of Research and Advanced Studies of the National Polytechnic Institute (Cinvestav) are working in the design of a tool capable of preventing this problem. The process consists in knowing the type of proteins in charge of metabolizing the drugs (enzymes) for each patient which would, helped by a mathematical

model, allow to establish the exact dose needed of the immunosuppressive drugs required.

This method will be capable of giving an effective certainty at the moment of establishing the treatment, will also save time and decrease rejection, increasing the quality of life, allowing the survival of more patients and optimizing the health system, informed Gilberto Castañeda Hernández from the department of Pharmacology.

According to the researcher, the enzymes that process the drugs have various grades of activity, so the immunosuppressive can be eliminated slowly or rapidly. Hence, the necessity of knowing, using genetic studies, what kind of proteins each person has to determine the adequate portion of the drug.

Every study is being carried in order to create a mathematical algorithm that will indicate for each person, using their genetics, size, age, current medication and time since the transplant, what should their immunosuppressive drug dosage should be.

Currently, the quantity of drug to be administrated is determined by trial and error; however, this process takes long and gives place to complications that are translated to an acute rejection.

"For example, the dosage that is used in Germany of the drug Nifedipine is not adequate for Mexicans because it gives them headaches, tachycardia and vasodilation, among other problems", says Castañeda Hernández.

The challenge will be to identify the patients that quickly metabolize the immunosuppressive such as Tacrolimus and Ciclosporin. "In Mexico both exist and its dosage is not the same as used in Europe or the United States; we have to find our own genetic variations".

In Mexico, a window of opportunity is to apply this system to kids, making it possible to determine the immunosuppressive treatment correctly. The child population has a special metabolism because of its development; hence, applying the analysis tools would have better results, assured Castañeda Hernández.

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