Soon after the Zika epidemic broke out in Brazil, Mayana Zatz – an acclaimed geneticist who, for the preceding four decades had been tracking rare genetic disorders that destroy muscles – received a surprise phone call from the scientific director of a research foundation in São Paulo.

Carlos de Brito Cruz told her Brazil was in a crisis and asked if she could contribute in any way.

It was 2015, and scientists were trying to establish a link between the Zika virus – usually a mild condition that can cause flu-like symptoms – and a horrifying birth defect called microcephaly in which babies are born with abnormally small heads. The affected children also face a lifetime of mental disabilities, seizures, as well as hearing and sight problems.

Prof Zatz’s first thought was: “I am not an infectologist, I have nothing to do with this.”

Over the years, she and her team at the Human Genome Research Centre had helped close to 30,000 patients, after identifying genes responsible for muscular dystrophies, mainly neuromuscular.

“But [after hearing more about the birth defects] this caught my eye right away because only a small percentage was suffering from it.” She immediately began to wonder whether there was a genetic component to the condition, so she rounded up her team and started looking for twins in Brazil’s worst-affected areas.

“What interests us very much is what protects some people from the effects of mutation,” says Prof Zatz, a larger-than-life 70-year-old, who has won accolades for her work as a scientist (see box).

Despite her scientific achievements, this new assignment was very different to the work she had been doing before. “This was completely out of her scope of action, she has never worked specifically with virology, but her acumen on this was incredible,” says Ernesto da Silveira, a biological engineer who is a member of her team in the Zika project.

The scientists identified Brazilian twins whose mother had been exposed to the Zika virus. Two pairs were identical and the rest were non-identical.

The identical twins all had microcephaly, but of the seven other pairs of non-identical twins, only one pair of twins was both affected.

The remaining six pairs were “discordant”, with only one child presenting with microcephaly, even though they had shared the same uterine environment.

“She got that stuck into her head, called us and said: ‘Let’s design a project, I think there is something there,’” Mr da Silveira says.

Prof Zatz and her team went to Recife and interviewed and examined the families and twins, with particular interest in the patients she called discordantes or anomalous – that had one twin affected while the other was not.

To identify any possible genetic component, her team compared all the gene sequences from eight pairs of twins and 10 other babies that developed the Zika syndrome.

They found that between 6 and 12 per cent of the babies born from mothers infected with the Zika virus had what Prof Zatz calls “congenital Zika syndrome”.

“[Even] if the baby has these genetic susceptibility factors, we believe the baby will not have microcephaly unless the baby is infected by the Zika virus,” Prof Zatz explains.

The results, published in Nature earlier this month, confirm the hypothesis of a genetic influence on susceptibility to the congenital Zika syndrome and microcephaly, she says.

More than that, it suggests that there could be a value in taking this line of research with other diseases.

“This [work] shows that genetics and infectious diseases can have an intersection,” Prof Katz says.

“We could identify the people with the genetic alteration and prioritise them in a future vaccine strategy. Same with mothers who are pregnant and have exposure to Zika, if they don’t have this gene, they do not have to worry,” says Prof Zatz, who has two children and has two grandchildren.

Since the outbreak, Zika has receded as people build up resistance to infection and authorities have been fighting the Aedes aegypti mosquitoes that spread the virus.

Brazil declared an end to its Zika emergency in May last year after recording a 95 per cent fall in the of 2017 compared to the previous year. However, the virus remains a health threat in the region and a return could affect future generations.

The World Health Organization announced last year that 31 countries had reported microcephaly cases, or central nervous system malformations, potentially linked to Zika.
Mystery: Mayana Zatz (bottom right) tested non-identical twins where only one of the pair had the Zika birth defect (above left, top) — Itaева Media/Dado Golban for Financial Times

CV Mayana Zatz

BORN
July 16, 1947, Tel Aviv, Israel. She moved with her family to Paris the following year and arrived in São Paulo in 1955.

EDUCATION
Bachelors in biology and PhD in human and medical genetics at University of São Paulo, post-doctoral research in medical genetics at UCLA.

TO STAY OR GO
She had several offers to stay on and work in the US, but decided to return to Brazil where she felt she could “make a difference”.

She returned to São Paulo to focus on the diseases that cause muscular dystrophy: “Nobody worked on that here then,” she says. She went on to pioneer the use of molecular biology in Brazil’s fight against rare diseases.

CAREER HIGHLIGHTS
1982 — 1992
Assistant professor of human and medical genetics, University of São Paulo

1992 — present
Professor of human and medical genetics, University of São Paulo

2000 — present
Director of the Human Genome and Stem-Cell Research Centre (Hug-Cell), University of São Paulo

1996 — present
Member of the Brazilian Academy of Sciences

2005 — present
Member of The World Academy of Sciences (TWAS), a Trieste-based institution that fosters science in developing countries

1981 — 2015
Founder and president of the Brazilian Muscular Dystrophy Association (ABDIM)

2010 — 2012
Board of revisers (BORE) for Science, the scientific journal

INTERESTS
Her interests include jogging, travelling, watching films and going to the theatre.