The kids are all right: Children with 3-way DNA are healthy

October 26 2016, by Marilynn Marchione And Malcolm Ritter

Emma Foster, 17, of Red Bank, N.J., speaks during an interview at St. Barnabas Hospital, in Livingston, N.J., Tuesday, Oct. 25, 2016. More than 15 years ago, 17 babies, including Emma, were born after an experimental infertility treatment that gave them DNA from three people: Mom, Dad and an egg donor. Now researchers have checked up on how the babies are doing as teenagers. The preliminary verdict: The kids are all right. (AP Photo/Richard Drew)

More than 15 years ago, 17 babies were born after an experimental

infertility treatment that gave them DNA from three people: Mom, Dad and an egg donor.

Now researchers have checked up on how the babies are doing as teenagers. The preliminary verdict: The kids are all right.

With no sign of unusual health problems and excellent grades in school at ages 13 to 18, these children are "doing well," said embryologist Jacques Cohen of the Institute for Reproductive Medicine & Science at Saint Barnabas in Livingston, New Jersey, where the treatment was done.

That includes Emma Foster, 17, of Red Bank, New Jersey. "I turned out normal," Foster said in an interview Tuesday. A cheerleader since age 10, she is now looking at colleges and thinking of majoring in engineering.

The infertility procedure is no longer performed. But the study of the children is timely because just last month, the first baby was born from a different procedure that also mixed genetic material from three people. That technique is aimed not at infertility but at preventing the child from inheriting harmful genes from the mother. Critics are concerned about its long-term safety.

So finding no problem so far from the infertility treatment is helpful and "a good message" for people considering the disease-prevention procedure, Cohen said. But he emphasized that his findings cannot be taken as proof that the newer procedure is safe and should be performed.

From left, Peter Foster, daughters, Emma and Kerry; wife, Susan Foster, and embryologist Dr. Jacques Cohen pose for a photograph at St. Barnabas Hospital, in Livingston, N.J., Tuesday, Oct. 25, 2016. More than 15 years ago, 17 babies, including Emma, were born after an experimental infertility treatment that gave them DNA from three people: Mom, Dad and an egg donor. Now researchers have checked up on how the babies are doing as teenagers. The preliminary verdict: The kids are all right. (AP Photo/Richard Drew)

Cells carry DNA in two places: the nucleus, where the chromosomes are, and to a much smaller degree the mitochondria. Mitochondria are the little powerhouses in the cytoplasm, the liquid part of the egg cell outside the nucleus.

Both DNA-mixing procedures involve the mitochondria; the one that recently produced the baby was aimed at replacing a mother's defective

mitochondria. Cohen's procedure injected a bit of mitochondria-containing cytoplasm into the mother's egg.

Genes in the mitochondrial DNA don't affect traits like eye and hair color but are important for keeping cells healthy throughout the body.

Cohen's hospital performed the infertility treatment between 1996 and 2001 on 33 couples who failed to conceive after roughly five tries at in vitro fertilization.

"We felt that there was something wrong with the cytoplasm" and that injecting a small amount of it from a healthy egg donor might aid embryo development, Cohen said.

Fourteen of the 33 patients became pregnant, and 13 ultimately gave birth to 18 babies, including two sets of twins and one of quadruplets. (One of the 18 babies was a twin from a standard egg donation; doctors also included data on that child in the follow-up study.)

Peter and Susan Foster, of Red Bank, N.J., parents of 17-year-old Emma, speak during an interview at St. Barnabas Hospital, in Livingston, N.J., Tuesday, Oct. 25, 2016. They had been trying for about seven years to have a baby, and when embryologist Jacques Cohen experimental procedure was described to them and they were asked if they were interested, they had no doubts, Peter said. (AP Photo/Richard Drew)

Cohen and colleagues presented their findings Wednesday in the journal Reproductive BioMedicine Online.

The parents of the quadruplets refused multiple requests for follow-up information; doctors know only that all four are alive and in high school.

In detailed surveys, parents of the 14 other children all reported their kids in good health. One has chronic migraines, two have mild asthma, one is obese, seven have allergies, and one has attention deficit disorder. None of those rates are unusual for that number of children, doctors

said. One boy was diagnosed with a borderline developmental disorder at 18 months but not when he was older, and he has an A average in school.

"These children have done well," Cohen said. "It's what we expected or at least had hoped."

At least two other clinics in the U.S. and several in other countries tried the technique after Cohen started it, but the U.S. work stopped after the Food and Drug Administration stepped in to regulate it. Cohen said his group tried to comply with the FDA's requirements for a permit to continue the work but lost funding before it could meet them.

It's not clear why the treatment worked for the 13 couples, Cohen said. One possibility is the infusion of mitochondria, but cytoplasm contains other molecules and structures too, he said.

Embryologist Jacques Cohen speaks during an interview at St. Barnabas

Hospital, in Livingston, N.J., Tuesday, Oct. 25, 2016. Cohen's hospital performed the three-person infertility treatments between 1996 and 2001 on 33 couples who failed to conceive after roughly five tries at in vitro fertilization. "We felt that there was something wrong with the cytoplasm," and that injecting a small amount of it from a healthy egg donor—a third person—might aid embryo development, Cohen said. (AP Photo/Richard Drew)

In any case, it was a success for Emma's parents, Susan and Peter Foster, who had been trying for about seven years to have a baby.

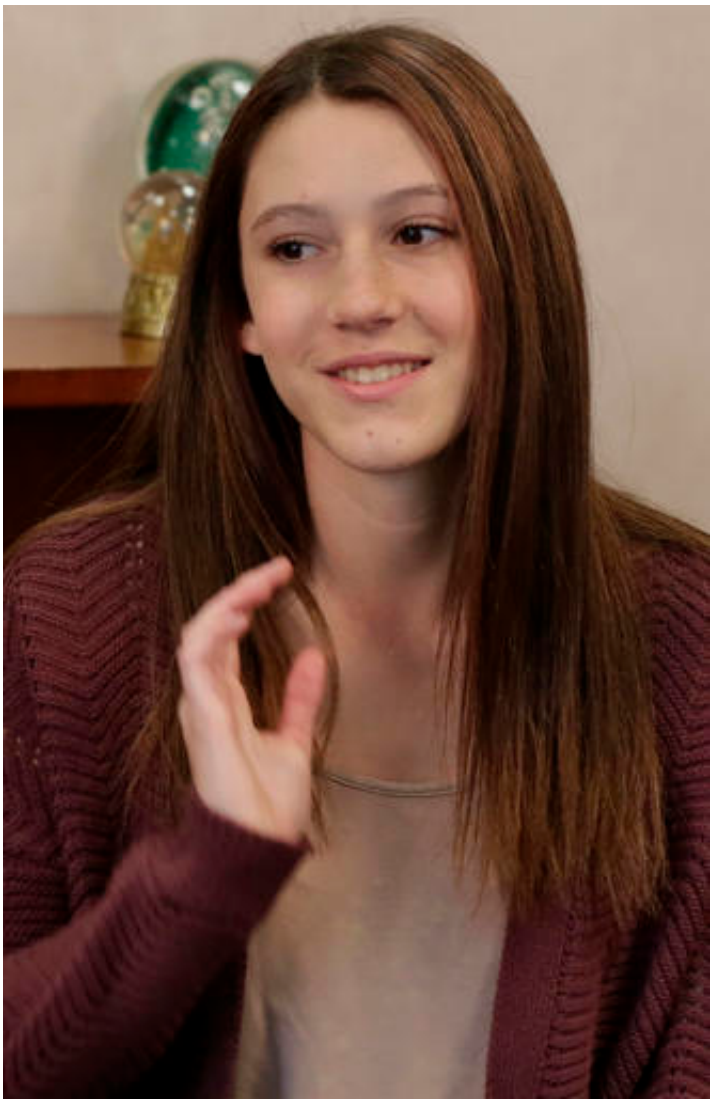
When Cohen's experimental procedure was described to them and they were asked if they were interested, they had no doubts, Peter said.

Susan gave birth at 33. Emma was healthy and has continued that way, her parents say.

Emma is the only child in the survey to have been told about the procedure. She said she has long known her origins were unusual—her mom keeps a book that shows her as an embryo—but she didn't know the specifics until recently.

"I think it's really cool," she said. "It makes me different."

She may no longer carry any trace of the donor. Only two of eight babies tested after birth showed any sign of donor mitochondria, and Emma was one who showed none. Cohen said the tests, which were not as sensitive then as now, might have overlooked some traces.



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The follow-up study has some limitations. It's based on a survey of parents, and the accuracy of such second-hand information can be shaky. And it includes just 13 teens, with no comparison group.

Still, Dr. James Grifo, director of infertility treatment at New York University, said the results suggest that criticism of research that mixes DNA from three people appears unfounded.

"The outcomes looked uniformly good ... suggesting that no harm was done," said Grifo, who did not participate in the new study. The donor cytoplasm "certainly may have played a role in allowing their embryo to develop to a stage that allowed a pregnancy."

In 1999, after years of experiments in mice, Grifo and colleagues made embryos with DNA from three people and transferred them to several patients' wombs, but no pregnancy resulted. Then the FDA stepped in and stopped the work.

"I think it should be allowed," Grifo said.

But Dr. Alan Copperman, director of infertility at Mount Sinai School of Medicine in New York, said the jury is still out on whether using a third party's genetic material is safe.

From left, Peter Foster; adopted daughter; Kerry, 12; his wife, Susan, and their biological daughter, Emma, 17, walk on the grounds outside St. Barnabas Hospital, in Livingston, N.J., Tuesday, Oct. 25, 2016. More than 15 years ago, 17 babies, including Emma, were born after an experimental infertility treatment that gave them DNA from three people: Mom, Dad and an egg donor. Now researchers have checked up on how the babies are doing as teenagers. The preliminary verdict: The kids are all right. (AP Photo/Richard Drew)

"I don't think that we're yet able to declare victory and that we've figured out how to fix an unhealthy egg or embryo," Copperman said. Most eggs that fail to develop normally, especially with older patients, are because of abnormal chromosomes, so tinkering with the cytoplasm is not likely to be a solution for many people, he said.

But it apparently worked for the Fosters.

Emma "is a blessing and a miracle," Susan Foster said, "and medical

science made that possible."

More information: Serena H. Chen et al. A limited survey-based uncontrolled follow-up study of children born after ooplasmic transplantation in a single centre, *Reproductive BioMedicine Online* (2016). DOI: 10.1016/j.rbmo.2016.10.003