

ANALYSIS OF ANEUPLOIDY AND GENE DEFECTS USING NEXT GENERATION SEQUENCING (NGS)

Allen Kung, Reprogenetics, 3 regent street, suite 301, Livingston NJ 07039, akung@reprogenetics.com, 973-4365010

Jamie Grifo, NYU Fertility Center, NYU Langone School of Medicine, 660 first Avenue, New York, NY 10016, 212-2637978, James.Grifo@nyumc.org

Kara N Goldman, NYU Fertility Center, NYU Langone School of Medicine, 660 First Avenue, New York, NY 10016, 212-263-0039, kara.goldman@nyumc.org

David Hill, drhill@artreproductivecenter.com, ART Reproductive Center, 450 North Roxbury Drive, Suite 500, Beverly Hills, CA-90210, 310-277-2393

1Reprogenetics UK, Institute of Reproductive Sciences Oxford Business Park North Oxford, Oxfordshire, United Kingdom, OX4 2HW

Santiago Munne, Reprogenetics, 3 regent street, suite 301, Livingston NJ 07039, munne@reprogenetics.com , 973-4365010. Disclosure #: 600513

Objective: simultaneous analysis of a sample for aneuploidy and gene defects can be currently done for any diseases using PCR plus array CGH, but it requires to develop a custom made test for each couple, which is time consuming. The objective of this study is to validate the use of NGS for the analysis of gene defects and aneuploidy on blastocyst biopsies without the need of customization.

Design: prospective multicenter study.

Material and Methods: Comparative analysis of 26 vitrified blastocysts from 6 patients, all of whom are carriers or affected for the following conditions: (Gaucher, Cystic Fibrosis, Tay-Sachs, Sickle Cell, Familial Dysautonomia, and Ehlers-Danlos Syndrome Type IV) was performed. Embryos analyzed had previously determined via aCGH and PCR either as chromosomally abnormal and/or as carriers/affected. These blastocysts were then thawed and biopsied again, and the biopsies were whole genome amplified with multiple displacement amplification. The amplified product was then split in to two aliquots. One aliquot was prepared using Ion Torrent's Ion Ampliseq, Inherited Disease Panel (IDP); the second aliquot was prepared using a custom made library prep. The samples were analyzed with NGS using an ion torrent PGM with 318 ion torrent chips. The NGS results were compared to those previously obtained by aCGH and PCR for the specific genetic diseases.

Results: NGS results were obtained in 26/26 embryos. Of these samples, 14/15 gave comparable results to those obtained by aCGH plus PCR; while 11/11 samples gave comparable results when obtained by separate aCGH and PCR testing.

Conclusions: The current protocol suggests that NGS can be used for those diseases in the IDP for detecting aneuploidy and gene defects simultaneously without the need of extensive customization so patients do not need to wait to be tested.