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P-777 Traceability and accountability in a “Virus-Free” vitrification program during the Covid-19 pandemic. Description of the first application of Blockchain for an IVF laboratory procedure

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Study question: To date, no publications exist describing Blockchain in IVF (Hickman, 2020). Can Blockchain technology be used for traceability and accountability in IVF laboratory procedures?

Summary answer: Blockchain is an easy-to-implement technology for incorruptible traceability of a “Virus-Free” vitrification/warming procedure.

What is known already: In healthcare, Blockchain can become a tool to address challenges regarding sensitive data-sharing and traceability of medical and laboratory procedures. During the Covid-19 pandemic, many authors warned about the role of LN2 as a potential vector for virus contamination, and vitrification and warming were identified as critical procedures for risk of contamination for environments, surfaces, operators and cells. In this study we describe the first application of Blockchain in IVF for incorruptible traceability of a “Virus-Free” vitrification/warming procedure based on the combined use of UVC-Sterilized Liquid Nitrogen (LN2) and CE Medical Devices (CE-MD).

Study design, size, duration: Report on 2346 Ethereum Blockchain data transactions for IVF laboratory procedures mined from 01/10/2019 to 31/12/2021. The procedures were oocyte/embryo vitrification, warming or handling in LN2 after cryopreservation. For each vitrification, warming and handling a UVC-sterilized batch of LN2 was associated with the code assigned to the vitrification/warming procedure and with the lot number of the single-use sterile vitrification box (N-Sleeve). The clinical results obtained from warmed oocytes/embryos were observed as completion of this process.

Participants/materials, setting, methods: A Blockchain trusted “Virus-Free” vitrification/warming programme was set up using a specifically designed CE-MD N-Bath-System (Nterilizer-Italy). Each procedure was traced by the CE-MD’s software and a dedicated web application. Finally, data were made incorruptible by Ethereum Blockchain transactions. Before oocyte/embryo warming, vitrification carrier washing with UVC-sterilized LN2 was performed in accordance with Parmegiani et al (2012) and recent international anti-Covid guidelines.

Main results and the role of chance: Of the 2346 Blockchain transactions 1268 regarded vitrification and cryopreserved specimen handling procedures; 1078 transactions were frozen cell warmings (308 oocytes and 770 embryos) performed on 799 patients. To date, 445 pregnancies have been obtained (pregnancy rate: 41% per cycle; 56% per patient) and 219 babies have been born.

Limitations, reasons for caution: Ethereum is a decentralized, open-source blockchain with smart contract functionality. Ether is the native cryptocurrency which is highly susceptible to cost changes. Other public or private

Blockchains may be used in future in healthcare with more stable transaction costs.

Wider implications of the findings: This is the first evidence of the application of Blockchain in IVF and many others will probably follow. Blockchain immutable records of LN2 sterilization combined with procedure codes and disposable lots represent incorruptible traces for “Virus-Free” vitrification/warming. During this pandemic 219 babies were born from cryopreservation procedures powered by Blockchain.

Trial registration number: Not Applicable