# Fluid velocity during embryo transfer

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## ABSTRACT

**Purpose:** The embryo transfer into the uterus by a transcervical catheter is the final stage of in-vitro fertilization procedure. So far, a little attention has been placed on the impact of embryo transfer procedure on embryo viability. This study was designed to analyze fluid velocity changes in the transferred load during the injection phase of embryo transfer.

**Materials and methods:** Computational fluid dynamics was applied to calculate fluid velocity changes in the transferred load for the following injection speeds: 0.01, 0.1, 1, 6, 12 and 20 m/s. A 3D geometrical model of the flow domain was created in ANSYS Modeler. The computations were carried out using the CFD code Parallel ANSYS Fluent 12.1 with the segregated solver SIMPLE (Semi-Implicit Method for Pressure-Linked Equations). The model was solved in double precision on a control volume unstructured 3D mesh made in ANSYS Mesher.

**Results:** The transferred fluid velocity was highest in the center of the catheter lumen and lowest at the proximity of the catheter's wall. The narrowing of catheter lumen diameter by 20% amplified the transferred fluid velocity by 78%. The abrupt increase in fluid velocity, caused by narrowing of the catheter tip was followed by the abrupt drop of fluid velocity outside the catheter.

**Conclusions:** Taking these results into consideration, it is advised to eliminate any narrowing of the catheter lumen in order to assure more favorable conditions for the transferred embryos.

**Key words:** Catheter, embryo, embryo transfer, fluid velocity, pressure based catheter