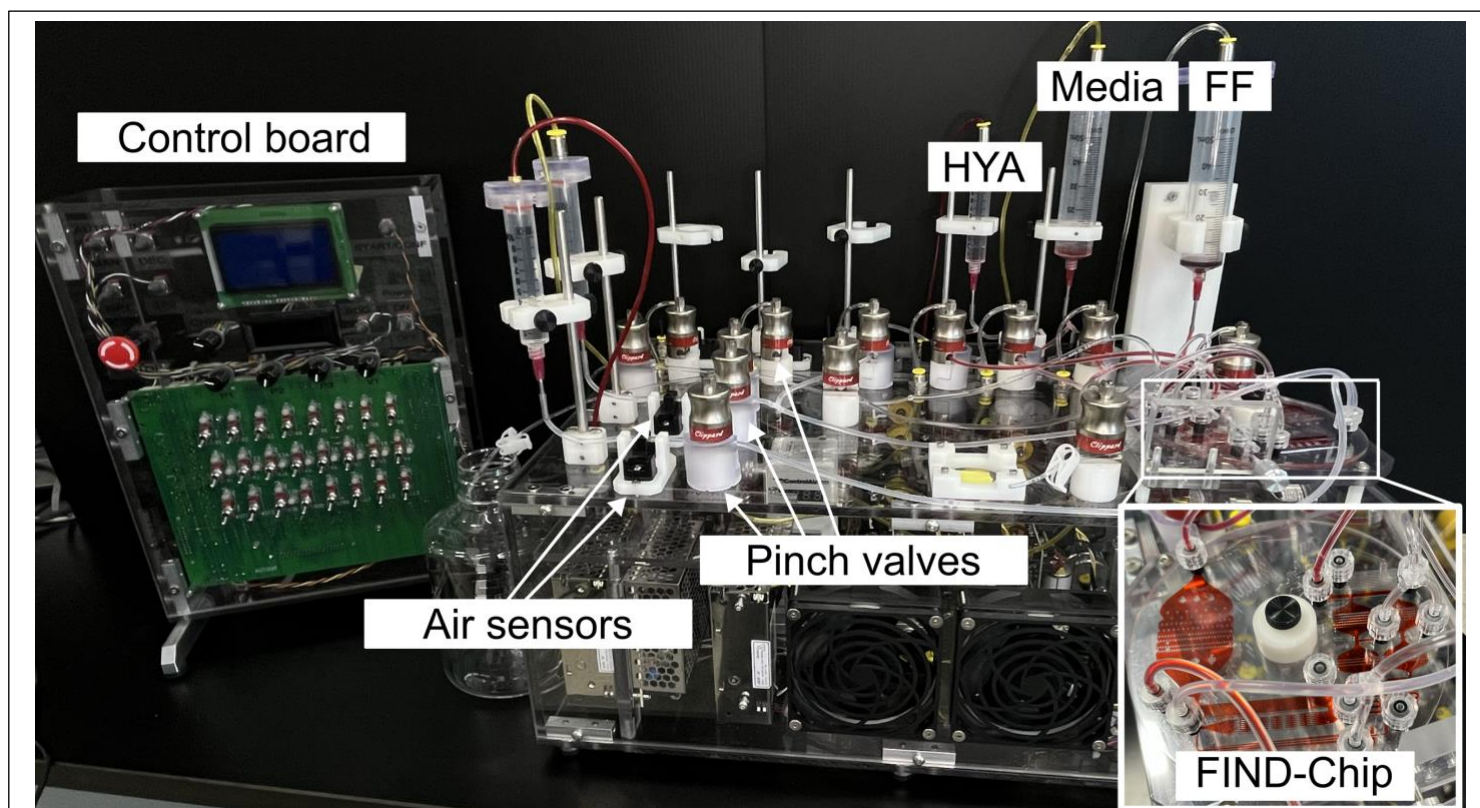


Microfluidic automation improves oocyte recovery from follicular fluid of patients undergoing in vitro fertilization

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Development and clinical evaluation of an automated microfluidic device to improve oocyte yield from follicular fluid in patients undergoing in vitro fertilization

Supplementary Information (SI) - Figure



Prototype instrument used for automated processing of follicular fluid with FIND-Chip. A microcontroller-based instrument was developed which incorporates pressure regulated reservoirs, together with pinch valves and air detectors on fluidic lines to automate fluid flow. The user needs to load follicular fluid (FF), handling media and hyaluronidase solution (HYA) to corresponding reservoirs and initiate the process using the control board. The process is completed automatically by the programmed microcontroller, by regulating the reservoir pressures to pre-determined values and by opening/closing the pinch valves based on timings or end-of-liquid trigger from the air sensors.

This prototype instrument also allows manual intervention and control of parameters for process development. During manual operation, pressure of each reservoir could be adjusted to desired level and pinch valves could be opened and closed with the user input. Once the protocol is ready to be automated, software controlling the system is programmed to execute the operations automatically. End-of-liquid sensors are used for triggering subsequent steps; upon detecting air, hence the end of the liquid in any given reservoir, next step in the protocol is initiated.

This system is custom designed and built for AutoIVF, and is the property of AutoIVF. The pictures above are taken by the authors for utilization in this publication.

Supplementary Information (SI) – Table

Institutional review board and study details

IRB number	Related figure	Inclusion criteria	Protocol details	Number of patients / embryo outcomes	Risk to participants
WCG-IRB #1300130	Fig 2	Adult patients, able to give informed consent, going through oocyte retrieval as part routine IVF treatment, who has more than 20 oocytes collected at retrieval procedure.	Protocol allowed patients who have more than 20 oocytes to donate increasing number of oocytes to research: - If COC count is 21 or 22, 1 is donated, - If COC count is 23 or 24, 2 are donated, - If COC count is 25 to 30, 3 are donated, - If COC count is more than 30, 4 are donated. These oocytes were used for validation of isolation and denudation process, after which they were discarded. As per the IRB protocol, participants involved in this study received \$1000 compensation.	Patients: 21 Embryo outcomes: N/A	This research is considered non-significant risk to patients, since the treatment success is minimally impacted after 20 collected oocytes.
WCG-IRB #1377160	Fig 3	Adult patients, able to give informed consent, going through oocyte retrieval as part of routine IVF treatment who has elected ICSI for fertilization.	Protocol enabled clinics to utilize the extra oocytes that were recovered by the AutoIVF system for the patient's treatment. AutoIVF system was operated in the clinic and these oocytes were returned to clinical workflow immediately after the automated process. As per IRB protocol, participants involved in this study received \$50 compensation.	Patients: 19 Embryo outcomes: 2 patients (Patient-1 had 3 frozen embryos, Patient-2 had 1 frozen embryo.)	This research is considered non-significant risk, since the standard of care was not altered and it was up to patient's discretion if embryos from the test arm were to be selected for transfer.
N/A	Fig 4	N/A	This protocol was IRB exempt per the decision of IRB with the "Not human subjects research" determination letter. For this research, screened and discarded follicular fluid was collected and processed with the AutoIVF system.	Patients: 582 Embryo outcomes: N/A	No risk to human subjects since only discard material is used for research and extra oocytes are not returned to the clinical workflow.