

Clinical embryology education programs must prepare graduates for the future



We thank Racowsky (1) for highlighting our recent article describing the development of a 2-year Masters of Health Sciences in Laboratory Medicine program at the University of Toronto directed at educating clinical embryologists and pathologists' assistants (2). We agree that Racowsky's (1) methods for training individuals to work as skilled clinical embryologists have lagged behind the tremendous advances in assisted reproductive technology (ART). We are proud to have developed a program aimed at filling this gap. We wish to comment on several of Racowsky's (1) points and provide additional insights, as appropriate.

The professional graduate degree program we described was conceived, in part, from the belief that formal directed knowledge and skills acquisition through an accredited educational program should be required for clinical embryology because it is for every other health care profession. As Racowsky (1) adroitly points out, fine motor skill is of paramount importance to a practicing clinical embryologist, and given the high complexity of a modern ART laboratory, sufficient experience cannot be fully provided within a 2-year educational program. She suggests that some in vitro fertilization (IVF) laboratory director colleagues may prefer the currently used apprenticeship model because this gives them the autonomy to train their own clinical embryologists to their specifications rather than hire those trained by others, supporting our thesis that there is insufficient quality control in the current model. The IVF laboratory directors who work with our graduates report that it is more efficient to train new hires who come with strong basic skills than to build skills from scratch. The hands-on training our students receive is purposefully progressive—beginning with simulation and then moving to a practical placement. During their time in our simulation skills development laboratory, students learn and practice foundational skills, from semen analysis and sperm assessment to blastocyst biopsy, embryo, and gamete cryopreservation, using human semen and rodent embryos as well as bovine ovaries and oocytes. Furthermore, we confirm that our students have mastered sufficiently these basic skills using standardized testing; therefore, we can assure future stakeholders of a high-level of competence among our graduates. After the demonstration of skill mastery, students begin a practical placement where they accumulate over 200 hours one-on-one with a preceptor in an IVF laboratory. In combination, both simulation and placement prepare our graduates to perfect their technical skills within their hiring laboratory, where they gain further refinement and experience, which are observed and documented in logbooks. These logs are often a requirement for full certification, which is independent of the university degree.

Somewhat surprisingly, Racowsky (1) questions the necessity of research exposure in the program. Some would say that one of the biggest threats to the credibility of ART providers is the indiscriminate adoption of unproven laboratory “add-ons” (3, 4). We believe the best way to combat this threat is to ensure that our embryology colleagues are able to critically appraise innovation and that our research focus develops the skills needed for this evaluation. Racowsky (1) also suggests that advances in robotics and artificial intelligence may obviate the need for clinical embryologists as we know them in the not-too-distant future. We agree that the role of the clinical embryologist will continue to evolve. We predict that advances may reduce the importance of fine motor hands-on skills and increase the demand for critical thinkers capable of applying sound research skills to solve complex problems within the overarching themes of ethics, medical advances, and gamete manipulation. We need to prepare for the embryologists of the future.

Unquestionably, our graduate program curriculum cultivates skills conducive to leadership roles in the clinical embryology laboratory. As we move forward, the possibility of graded levels of clinical embryologist training, similar to the nursing profession, should be discussed, as pointed out by Racowsky (1). Formalization of the required elements of these educational programs and oversight through accreditation will become of paramount importance to ensure that what constitutes the degree for the clinical embryology professional is defined. We look forward to future collaborations and continued discourse as an academic community working together to advance the field of clinical embryology.

CRedit Authorship Contribution Statement

Heather Shapiro: Conceptualization, Writing – review & editing. **Danielle C. Bentley:** Conceptualization, Writing – review & editing. **G.Scot Hamilton:** Conceptualization, Writing – review & editing. **Pat Chronis-Brown:** Conceptualization, Writing – review & editing. **Avrum I. Gotlieb:** Conceptualization, Writing – review & editing. **Theodore J. Brown:** Conceptualization, Writing – original draft, Writing – review & editing.

Declaration of Interests

H.S. has nothing to disclose. D.C.B. has nothing to disclose. G.S.H. has nothing to disclose. P.C.B. has nothing to disclose. A.I.G. has nothing to disclose. T.J.B. has nothing to disclose.

Heather Shapiro, M.D.^{a,b}
Danielle C. Bentley, Ph.D.^{b,c}
G. Scot Hamilton, Ph.D.^b
Pat Chronis-Brown, M.Sc.^b
Avrum I. Gotlieb, M.D.^b
Theodore J. Brown, Ph.D.^{a,b,d}

^a Department of Obstetrics and Gynecology, University of Toronto; Mount Sinai Fertility, Sinai Health, Toronto, Ontario, Canada; ^b Department of Laboratory Medicine and Pathobiology, University of Toronto; Mount Sinai Fertility, Sinai Health, Toronto, Ontario, Canada; ^c Division of

Anatomy, Department of Surgery, University of Toronto, Toronto, Ontario, Canada; ^d Lunenfeld-Tanenbaum Research Institute, Sinai Health, Toronto, Ontario, Canada

<https://doi.org/10.1016/j.xfre.2023.11.010>

REFERENCES

1. Racowsky C. Training and recognition of clinical embryologists as professionals-now, but what does the future hold? *F S Rep* 2023;4:254–5.
2. Shapiro H, Brown TJ, Chronis-Brown P, Hamilton GS, Bentley DC, Kandel R, et al. Education of the clinical embryology laboratory professional: development of a novel program delivered in a laboratory medicine department. *F S Rep* 2023;4:262–9.
3. Lensen S, Hammarberg K, Polyakov A, Wilkinson J, Whyte S, Peate M, et al. How common is add-on use and how do patients decide whether to use them? A national survey of IVF patients. *Hum Reprod* 2021;36:1854–61.
4. Perrotta M, Hamper J. The crafting of hope: contextualising add-ons in the treatment trajectories of IVF patients. *Soc Sci Med* 2021;287:114317.