AUSTRALIAN INSTITUTE OF MEDICAL AND CLINICAL SCIENTISTS

AIMS IVF Embryologist Professional Examination (ANZSCO 234611)

EXAMINATION PACK

This pack contains:

- **Guidelines for the AIMS IVF Embryologist Professional Examination**
- **Study Guide for the AIMS IVF Embryologist Professional Examination**
- **AIMS Online Remote Proctored Examination Rules**
- **Sample Questions**

AUSTRALIAN INSTITUTE OF MEDICAL AND CLINICAL SCIENTISTS

Guidelines for the AIMS IVF Embryologist Professional Examination (ANZSCO 234611)

APPLICANTS ARE STRONGLY ADVISED TO READ THESE GUIDELINES CAREFULLY BEFORE COMPLETING THE APPLICATION FORM

The AIMS IVF Embryologist Professional Examination

The AIMS IVF Embryologist Professional Examination is a Multiple-Choice Question (MCQ) paper consisting of 80 single response questions to be completed in two (2) hours. The examination is conducted twice a year in March and September using online remote proctored software. Remote proctoring involves sitting the exam under live supervision using your computer's webcam and your mobile phone in a suitable location with reliable internet connectivity. The examination consists of the following sections:

Infertility Treatment Strategies	16 marks
Ovarian Stimulation, Follicle and Oocyte Maturation and pregnancy	20 marks
Andrology and Processes of Fertilisation	20 marks
The ART Laboratory and associated processes for embryo development and cryopreservation	24 marks
Total	**80 marks**

The examination is marked using the test system software and all results are subject to a moderation process before being released to the candidate.

The examination is set at the level expected of a professional Medical Laboratory Scientist – IVF Embryologist with at least two (2) years postgraduate experience. All sections are compulsory. To pass the IVF Embryologist Professional Examination overall, candidates must obtain a total of 60% or more (i.e. at least 48 correct answers from the 80 questions).

In addition, candidates must also achieve a result of more than 60% for the 4th section "The ART Laboratory and associated processes for embryo development and cryopreservation" (i.e. at least 15 correct answers from the 24 questions).

Completed examinations are not released under any circumstances.

Applicants who are successful in the IVF Embryologist Professional Examination will be classified as suitable for the occupation of **Medical Laboratory Scientist (ANZSCO 234611) Specialisation: IVF Embryologist.**

Please note: If you have not completed **Stage 1** of your assessment of professional skills and qualifications then you are not able to apply for the professional examination. For further information, please contact the AIMS National Office.

AIMS IVF Embryologist Professional Examination Application and Payment Deadlines

You must apply in writing to sit the AIMS IVF Embryologist Professional Examination using the application form provided in the examination pack with the Stage 1 *Skills Assessment Results Letter*. Closing dates to receive the Stage 2 examination application form are:

- **1 December** for the **March** Examination
- **10 July** for the **September** Examination.

Emailed applications to sit the examination **must** be received no later than 4pm on the specified date.

Following the closing date for applications, you will be registered for the examination and sent a link for payment.

Payment due dates for the examinations are:

- **31 January** for the **March** Examination
- **8 August** for the **September** Examination.

You will receive notification of your: examination date; allocated starting time; instructions regarding your practice test, trial exam, official exam; and detailed instructions on how to install the WebLock secured web browser software. The notification will be sent by the AIMS third party examination service provider to the email address provided on your application form. The notification email will be sent to you by:

- The second week of **February** (for **March** examinations)
- The second week of **August** (for **September** examinations).

If you do not receive your notification by **15 February** (March examination) or **15 August** (September examination), please contact us immediately at exam@aims.org.au.

English Language Requirement

Applicants do not need to supply an English Proficiency Test Report for a second time provided the application for the AIMS IVF Embryologist Professional Examination is received by AIMS within **three** (3) years of the date of the applicant's Stage 1 *Skills Assessment Results Letter*.

Fees

All Fees are in Australian Dollars (AUD) and are non-refundable. Refer to the AIMS website for current fees.

Photographs and Candidate Identification

Please submit one (1) colour photograph with your application form. The photograph must be of good quality, taken within the last 6 months and taken against a light coloured plain background. Self-taken photographs are not acceptable.

The remote proctor will ask you to show your ID prior to the commencement of your online trial and official examinations. Acceptable IDs for candidates sitting examinations will be as follows:

A. Candidates sitting in Australia or New Zealand will need to provide one (1) of the following:
   - Passport or
   - Australian / NZ driver's licence.
B. Candidates sitting overseas will need to provide one (1) of the following:
   - Passport or
   - Government issued overseas driver's licence (with photo).

Enrolment deferral

A request to defer enrolment to the next examination session must be sent in writing to exam@aims.org.au **prior to the payment deadline for the current examination session**. For example, an applicant enrolled in the March examination wishing to defer to the September examination must submit a deferral request prior to the March payment deadline (31 January). Requests received after the payment deadline will not be accepted.

Once a deferral request has been received, an applicant will be asked to submit a new application form (and recent photograph) for the next examination session. This application must be received **prior to the expiration of the three (3) year validity period** stated on the applicant's Stage 1 *Skills Assessment Results Letter*. The examination **deferral fee** can be found on the AIMS website. Examination fees will not be refunded.

Results

It will take up to ten (10) weeks to receive your AIMS IVF Embryologist Professional Examination result. Results will be given as either a PASS or FAIL. Exact marks will not be given.

Checklist

- ☐ Complete application form with the declaration signed in ink
- ☐ Complete payment information
- ☐ Scan the application form in colour to PDF file format.
- ☐ Email the scanned application form and photograph.

Lodging Your Examination Application

Email your completed examination application form and photograph to exam@aims.org.au.

Further Information

Telephone:	+61 7 3876 2988
Enquiries / Applications:	exam@aims.org.au
Website:	www.aims.org.au

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Study Guide

AIMS IVF Embryologist Professional Examination ANZSCO 234611

Major Areas of Knowledge

The major areas of knowledge expected of candidates are as follows:

Infertility Treatment Strategies

Being familiar with underlying causes and understanding different treatment strategies associated with infertility, such as:

- Male, female and idiopathic infertility diagnoses
- Primary and secondary infertility
- Miscarriages and early pregnancy failure
- Tests to assess the fertility potential of a patient or couple including semen analysis, function tests and hormonal assessments
- Reasons for treatment including medical, social, genetic, hormonal and physical
- Types of treatment: surgical, ovulation induction, IUI, IVM, IVF, ICSI, gamete donation, surrogacy, IVF/ICSI and PGT-A and/or PGT-M
- Patient and donor screening, lifestyle assessment and counselling requirements
- Risk factors with ART
- Reporting and measurements of success in ART

Ovarian Stimulation, Follicle and Oocyte Maturation and Pregnancy

Basic knowledge of female reproductive system and a critical understanding of ART stimulation protocols, endometrial receptivity and pregnancy outcomes, including:

- Ovarian anatomy and function
- Regulating factors of the menstrual cycle
- Oogenesis, folliculogenesis
- Meiosis and mitosis
- Controlled ovarian hyperstimulation regimes and rationale for:
    - Agonist or antagonist
    - Urinary or recombinant FSH
    - HCG or agonist trigger
    - Individualised for patient or one size fits all
    - Monitoring follicles by ultrasound and E2 levels
    - Triggering or cancelling cycles
    - Oocyte collection procedures, from patient to laboratory
    - Recognising oocyte maturity and markers of oocyte competence
    - Understanding processes to reduce oocyte stress
    - Denudation and maturation assessment
- Endometrial receptivity and implantation in a natural pregnancy
- Embryo transfer strategies and rationale for:
    - Timing and day of transfer post HCG
    - Frozen embryo transfers (natural cycle or HRT)

- Luteal support
- Multiple or single embryo transfer

Andrology and Processes of Fertilisation

A basic knowledge of the male reproductive system and a critical understanding of diagnostic and therapeutic andrology procedures including:

- Testicular and epididymal anatomy and function
- Hormonal and molecular control of male reproduction
- Spermatogenesis
- Sperm motility, gamete interaction (acrosome reaction, sperm decondensation, oocyte activation, pronuclei formation and syngamy to first cleavage)
- Semen analysis (using WHO 2010 guidelines), specifically regarding the clinical significance and accuracy of assessing:
  - Ejaculate volume and pH
  - Motility (manual or CASA)
  - Concentration (Haemocytometer, Makler or CASA)
  - Morphology (wet or dry stained preparation, manual or CASA)
  - Antibodies (direct or indirect tests)
  - DNA integrity (assessing single or double strand breaks, manual microscopic analysis, CASA or flow cytometry).
- Diagnostic parameters for ART treatment options:
  - Natural, IUI, IVF or ICSI criteria
  - PESA, MESA, TESE criteria
- Preparation of sperm for ART procedures:
  - Swim up, swim out, gradient centrifugation
  - Centrifuge speeds, media, gas, pH and temperature considerations
  - Insemination concentrations and acceptable motility scores for IVF and IUI
  - Alternative treatments for potential therapeutic value:
    - PICSI, IMSI, MACS, ICSI with hyaluronan

The ART Laboratory and associated processes for embryo development and cryopreservation

Recognise the principals of quality assurance and quality control and identify the correct laboratory environment and equipment required to run an effective ART laboratory including:

- Understanding key components of an embryo culture system:
  - Equipment:
    - Microscopes, (dissecting, inverted, compound)
    - Incubators including time-lapse (type, gas level, humidity)
    - Workstations: Laminar flow, humidicribs.
  - Consumables:
    - Dishes, tubes, pipettes, oil
    - Media (components, osmolarity, Ph, buffer).
- Scoring embryo growth and potential using morphology criteria, morphokinetics (including time-lapse), metabolomics, alternate systems:
  - PN scoring
  - Cleavage stage scoring
  - Blastocyst scoring
- Embryo transfer technique:
  - Catheters, placement, media,
  - Scoring degree of difficulty
- Principals of cryopreservation:

- Cryoprotectants, additives, vitrification, slow cooling
- Timing, temperature, volume and device
- What to freeze (oocytes, embryos, sperm, ovarian tissue)
- When to freeze
- How to freeze and thaw (warm)

- Benchmarking and key performance indicators:
  - Follicle yield and oocyte maturity
  - IVF fertilisation rates
  - ICSI fertilisation and damage rates
  - Cleavage and blastocyst rates
  - Embryo utilisation rates
  - Frozen embryo survival rates
  - Positive hCG, foetal heart and live birth rates (including multiples)
- Quality assurance:
  - ID procedures and traceability
  - Validation and log books/databases
  - SOPs
  - Safety and troubleshooting, adverse event reporting and monitoring
  - Personnel, safety, hygiene, clothing, caseload
- Laboratory:
  - Layout
  - Air flow and VOC control
  - Cleaning
  - Gas and liquid nitrogen management
  - Safety in the laboratory

Recommended Reading List

1. Catt J and Lingham E. *SIRT Embryology Training manual and logbook*. Available for purchase via FSA website (https://waldronsmith.eventsair.com/sirt-training-manuals/nmem) or soft copy available for free to SIRT members on SIRT members only webpage (https://www.sirt.org.au).
2. Coward K and Wells D (Eds) *Textbook of Clinical Embryology.* Cambridge University Press, UK.
3. Elder K and Cohen J (Eds) *Human preimplantation embryo selection*, Informa UK Ltd.
4. Fleming S and Cooke S (Eds) *Textbook of Assisted Reproduction for Scientists in Reproductive Technology.* Vivid Publishing *(*soft copy Available free to SIRT members on SIRT members only webpage; (https://www.sirt.org.au*).*
5. Gardner DK, Rizk BRMB and Falcone T (Eds) *Human Assisted Reproductive Technology*. Cambridge University Press, UK.
6. Harper J (Ed). *Preimplantation genetic diagnosis,* Cambridge University Press, UK.
7. Kruger TF and Franken DR (Eds) *Atlas of human sperm morphology evaluation*. Taylor & Francis, London & New York.
8. Mortimer ST and Mortimer D *Quality and risk management in the IVF laboratory,* Cambridge University Press, UK.
9. Quinn P (Ed) *Culture Media, Solutions, and Systems in Human ART.* Cambridge University Press, UK.
10. Tan SL, Chian RC and Buckett WM (Eds) *In-vitro maturation of human oocytes: Basic science to clinical application*, Informa UK Ltd.
11. Tucker MJ and Liebermann J (Eds) *Vitrification in assisted reproduction: a user's manual and trouble-shooting guide,* Informa UK Ltd.
12. Van den Bergh M, Ebner T and Elder K *Atlas of Oocytes, Zygotes and Embryos in Reproductive Medicine,* Cambridge University Press, UK.
13. World Health Organization *WHO laboratory manual for the examination and processing of human semen,* World Health Organisation.

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Online Remote Proctored Examination Rules

1. The candidate will be monitored in real time by an online proctor, employed by the third party examination service provider, to detect any evidence of academic misconduct.
2. The candidate must complete one (1) practice test (at any time of their choosing), before they sit a trial examination.
    - The intent of the practice test is to give the candidate the opportunity to verify they have successfully installed the WebLock secured browser and to become familiar with the online examination interface.
3. The candidate must complete one (1) trial examination within two (2) weeks prior to sitting for the official examination.
    - The intent of the trial examination is to take the candidate through the process of doing the examination online with the supervision of a remote proctor.
    - Failure to complete the trial examination may disqualify the candidate from sitting for the official examination.
4. The questions in the practice test and the trial examination are a small selection from the same example questions that can be found in this Examination Pack and will not be scored and will not be used in the candidate's assessment results.
5. The candidate must do their practice test, trial examination and the official examination on the **same computer** that they have installed the WebLock secured browser.
6. Candidates are required to type their answers in English.
7. Whilst the online examination interface continuously captures the candidate's answers as the candidate progresses through the examination, the candidate must submit their examination before the end of the two (2) hour examination period.
8. During the examination period, the candidate will be able to review and modify their answers before they submit their examination.
9. During the examination, the examination interface will indicate the time remaining.
10. The candidate MUST show a photo ID (passport or driver's license) to the remote proctor before commencing the trial and official examinations.
11. No headphones can be used during the examination.
12. The candidate must **not** have in their room any books, dictionaries, notes or other documents.
13. The candidate must **not** have in their room devices except for those authorised by the remote proctor.
14. No person other than the candidate is permitted in the room at any time during the examination.
15. No bathroom or rest breaks are allowed during the examination unless a candidate has applied for approved special consideration due to a disability or medical condition.
16. A blank sheet of paper and a pen is allowed on the candidate's desk for workings only.
17. The candidate must remove any smart watches, jewellery, scarfs (not including religious headwear), caps and hats.
18. A calculator will **not** be required for the examination. The examination may include simple arithmetic calculations.
19. Academic misconduct may include any of the following activities:
    - Copying material from other sources and presenting it as their own work.
    - Impersonating a registered candidate.
    - Collaborating with another person when completing the online examination as it must be the candidates own work.

- Unauthorised access to examination questions or related material before or after the examination.
- A failure to follow the rules of the examination that gives the candidate an advantage.
- **Inappropriate** use of a mobile phone, other electronic devices including smart watches, electronic calculators, iPads, tablets.

20. Examination answers must reflect the candidate's own work.
21. Plagiarism detection software will be used to monitor candidate examination papers submitted for review.
22. No candidate shall in any way give assistance to, or receive assistance from, any other person before, during, or after the examination.
23. The candidate will be recorded via video if the remote proctor believes there is an incident of misconduct. If the incident continues after a warning, the candidate's examination will be cancelled and the incident reported to AIMS.
24. Misconduct in examinations shall be reported in writing by the remote proctor to AIMS, and AIMS will conduct an investigation.
25. A candidate who is found to be guilty of misconduct in an examination may have their examination paper declared null and void.
26. Candidates will be expected to start their examination at the time allocated by the examination service provider.
27. If a candidate believes there was an error in a question, then they should report it to AIMS within five (5) business days after they have completed their online examination.
28. Candidates who have a disability and / or medical condition and who may require special examination requirements can apply in writing to AIMS for an assessment. A certificate from the candidate's medical doctor must be submitted with the application for special examination requirements. The medical doctor's certificate must justify the special examination requirement and describe the special examination needed. Special examination requirements may include:
    - A candidate is given additional writing time depending on the level of their disability. The additional time will be automatically added to their exam duration by the exam service provider.
    - A candidate is given approved rest breaks. The additional time for the rest breaks will be added to their exam duration by the exam service provider.
29. Candidates must submit their written application for special examination requirements no later than three (3) weeks prior to the date of the examination. The application may be submitted as an attachment to an email.
30. Candidates who have been significantly affected by ill health or other serious circumstances just prior to taking the examination may be eligible to apply for *special consideration*. Special consideration is a post-examination adjustment that compensates candidates who were suffering from a temporary illness or condition or who were otherwise disadvantaged at the time of the examination.
31. An application for *special consideration* will only be considered if on the day of the examination or just prior to taking the examination:
    - The candidate was adversely affected to a substantial degree by illness or other cause, and / or
    - The circumstances were beyond the candidate's control.
32. Examples of ill health: the candidate is hospitalised, or the candidate has a life threatening disease.
33. Example of a serious circumstance: there has been a death in the candidate's **immediate** family.
34. Missing examinations: candidates are strongly advised to attend their designated examination unless the candidate is physically incapable of doing so. Missing an examination does not automatically entitle the candidate to a *special consideration*.
35. Candidates must submit their written application for *special consideration* no later than three (3) working days after the date of the examination. The application may be submitted as an attachment to an email.
36. The candidate has five (5) working days from when they lodge their application for special consideration in which to submit supporting documents from an appropriate professional. Applications lodged without supporting documentation will not be considered.
37. The supporting documentation for *special consideration* due to ill health must be a certificate written by the candidate's medical doctor. The certificate must state that the candidate was physically incapable of completing the examination on the designated day of the examination.

38. The supporting documentation for *special consideration* due to serious circumstances includes the following:
    - letter from a social worker, lawyer, or psychologist
    - death notice or certificate and evidence of relationship
    - police report
    - statutory declarations from relevant people
    - notification from:
        - defence services
        - Juries Commissioner's Office
        - emergency service organisations such as the Country Fire Authority.
39. Candidates must ensure that they are familiar with AIMS Code of Professional Conduct.
40. Academic misconduct in examinations is a prohibited activity and would contravene the AIMS Code of Professional Conduct.

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AIMS IVF Embryologist Professional Examination - Sample Questions

PLEASE NOTE THESE QUESTIONS ARE FOR GUIDANCE ONLY.

NO FURTHER SAMPLE QUESTIONS WILL BE PROVIDED BY AIMS

Infertility Treatment Strategies

1. Regarding IUI, which of the following statements is MOST correct?
    a. Soft flexible IUI catheters give better clinical pregnancy rates than hard IUI catheters
    b. Pelvic disease is usually a contraindication for IUI
    c. Sexual dysfunction in either partner is usually a contraindication for IUI
    d. Over four (4) stimulated cycles IUI is not as cost-effective as intra-cytoplasmic sperm injection
2. What is meant by the cumulative pregnancy rate per cycle?
    a. Pregnancy rate after fresh ET
    b. Pregnancy rate from fresh and frozen embryos derived from one fresh cycle
    c. Chance of getting pregnancy per cycle
    d. Pregnancy rate for the previous year

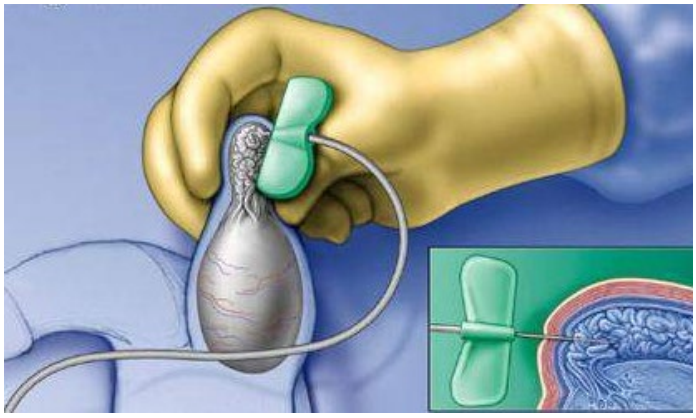
Ovarian Stimulation, Follicle and Oocyte Maturation and pregnancy

1. Regarding patient stimulation protocols, select the INCORRECT answer:
    a. GnRH antagonists bind to the same cell-surface receptors as GnRH agonists
    b. An agonist trigger can reduce OHSS risk without compromising the success rates of a fresh embryo transfer
    c. The risk of an LH surge with an antagonist is approximately 1%
    d. Ovarian reserve, FSH dose and some lifestyle factors impact how many follicles a patient will have
2. Decidualisation is a process of differentiation of which cells?
    a. Endometrial epithelial cells
    b. Anterior pituitary cells
    c. Myometrial cells
    d. Endometrial stromal cells
3. The most important hormone in preparing the Fallopian tubes for embryo transport is:
    a. Estrogen
    b. Luteinising hormone
    c. Progesterone
    d. Inhibin
4. Follicle flush buffer should contain:
    a. Heparin
    b. Protein
    c. Amino acids
    d. All of the above

5. What is the best way to keep a collection tube at 37C during oocyte pick up?
    a. Closed hand
    b. Tube heater
    c. Water bath
    d. Primed tube in tube heater

Andrology and Processes of Fertilisation

1. Which of the following statements is INCORRECT?
    a. High force centrifugation and rapid temperature changes can affect sperm motility
    b. Short insemination protocol helps avoid exposure of zygotes to high density of free radicals generated by excess spermatozoa and degeneration of cumulus cells
    c. Semen samples with a motility of less than 5% are not suitable for ICSI
    d. Discontinuous density gradients are used to filter out cells and debris from semen samples
2. What is the expected 1PN rate following conventional IVF?
    a. Less than 1%
    b. Less than 10%
    c. Depends on oocyte quality
    d. Depends on sperm concentration
3. What is the normal level of sperm morphology as defined by WHO 2010?
    a. 4%
    b. 6%
    c. 8%
    d. 10%
4. Which procedure is illustrated in this diagram?



(Image source: http://bahmanivf.com/en/)

    a. TESA
    b. TESE
    c. PESA
    d. Microdissection TESE
5. Which is the abstinence period suggested by WHO 2010 prior to semen analysis?
    a. One to two days
    b. Two to five days
    c. Two to seven days
    d. Greater than seven days

6. What is the normal insemination range used in conventional IVF?
    a. 80 to 120 x 10^2 /ml
    b. 80 to 120 x 10^3 /ml
    c. 10,000 per oocyte
    d. 20,000 per oocyte
7. What is the most likely cause of polyspermia in conventional IVF?
    a. Too many sperm in insemination well
    b. Too long an insemination period
    c. Oocyte cytoplasmic immaturity or poor oocyte quality
    d. Not enough cumulus cells
8. An oocyte has 2 polar bodies and 0 pronuclei at the time of fertilization check. What has happened?
    a. Normal fertilization
    b. Syngamy
    c. Oocyte activation
    d. Abnormal fertilization

The ART Laboratory and associated processes for embryo development and cryopreservation

1. Which of the following statements is TRUE?
    a. Timelapse incubators are usually humidified
    b. Media equilibration time is not affected by altitude
    c. Media under oil equilibrates more slowly than media without oil
    d. The pH of media decreases with decreasing O_2.
2. Optimal developmental rate of a human 4-cell embryo in vitro is:
    a. Pronuclei at 16-18 HPI, Syngamy at 23-24 HPI, 4-cell at 48 HPI
    b. Pronuclei at 6 HPI, Syngamy at 23-24 HPI, 4-cell at 42 HPI
    c. Pronuclei at 16-18 HPI, Syngamy at 23-24 HPI, 4-cell at 44 HPI
    d. Pronuclei at 12 HPI, Syngamy at 24 HPI, 4-cell at 48 HPI
3. Which of the following are VOCs?
    a. Methane
    b. Butane
    c. Ethanol
    d. Hydrogen peroxide
4. Which gloves are best for general embryology work?
    a. Latex
    b. Powder-free latex
    c. Nitrile
    d. Those that are least toxic
    e. Any gloves
5. What is the best incubator gas mix for embryo culture at sea level?
    a. 5% carbon dioxide in air
    b. 6% carbon dioxide in air
    c. 6% carbon dioxide, 5% oxygen
    d. 5% carbon dioxide, 6% oxygen

6. To achieve a pH of 7.3 in medium containing 25 mM bicarbonate, what % CO_2 is required?
    a. 5.0%
    b. 5.5%
    c. 5.8% at sea level
    d. 6.0%
7. Which of the following is not a penetrating cryoprotectant?
    a. Glycerol
    b. DMSO
    c. Propanediol
    d. Polyethylene glycol (PEG)
8. How many cells are taken in a blastocyst biopsy for PGT?
    a. Less than 5
    b. Between 5 and 10
    c. Between 10 and 15
    d. Between 15 and 20
9. Why are biopsied cells washed before transferring to the analysis tube?
    a. Removes foreign DNA
    b. Removes culture media that affects amplification
    c. Removes salts that affect amplification
    d. Removes non-cellular material