Causes and diagnosis
of infertility

including
appropriately timed tests

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Reader in Reproductive Medicine

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Infertility causes and diagnosis :

Aim of investigations

- Establish a diagnosis

- Direct treatment if possible
  and appropriate

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Infertility causes and diagnosis

Infertility

is the inability of a couple to conceive having
been exposed to the possibility of
pregnancy for one year
(regular, unprotected intercourse)

Primary >>>> **Secondary**

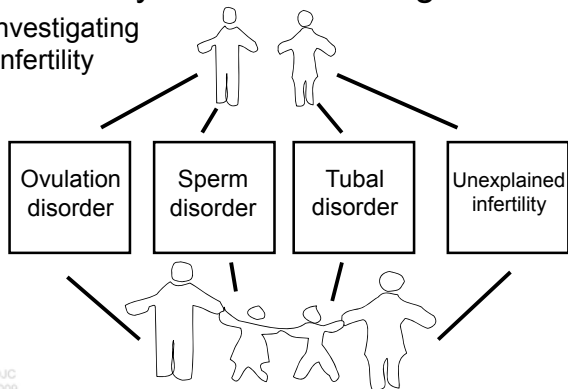DJC
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Infertility causes and diagnosis :

What are the common causes of infertility

ovulatory disorder	**20-30%**
sperm dysfunction	**14-25%**
tubal damage	**15-30%**
unexplained infertility	**15-25%**
endometriosis	6-11%
azoospermia	3 - 9%
cervical mucus disorder	3 - 5%

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Infertility causes and diagnosis :

Investigating infertility

Ovulation disorder	Sperm disorder	Tubal disorder	Unexplained infertility

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Infertility causes and diagnosis :

Investigating infertility:

Focussed history and examination (Female)

History
Previous contraception / pregnancies
Medical / surgical history
Cervical smear history
Current medical illness
Drug history - prescribed and misuse
Menstrual regularity

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Infertility causes and diagnosis :

Investigating infertility:

Focussed history and examination (Female)

History

Examination
BMI
Signs of endocrine disorder, particularly polycystic ovary syndrome

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Infertility causes and diagnosis :

Investigating infertility: Focussed history and examination (Female)

History

Examination

General investigations
Rubella serology
Full Blood Count
Hepatitis B and C, HIV

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Infertility causes and diagnosis :

Investigating infertility:

Focussed history and examination (Male)

History
Occupation
Medical / surgical history
Current medical illness
Drug history prescribed and 'recreational'
Erectile or ejaculatory difficulty

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Infertility causes and diagnosis :

Investigating infertility:

Focussed history and examination (Male)

History

Examination
? Value unless indicated by medical history

Infertility causes and diagnosis :

Investigating infertility: Focussed history and examination (Male)

History

Examination

General investigations
Hepatitis B and C, HIV
Semen analysis (at least one)

Infertility causes and diagnosis :

Investigating infertility: Ovulatory disorders

regularity of cycles
recognition of mucus
basal body temperature
Serum progesterone in luteal phase
Serum gonadotrophins in early follicular phase
LH predictor kits
TSH / prolactin

Ultrasound scans

Infertility causes and diagnosis : ovulatory disorders

- regularity of cycles

  regular
  painful
  moderate to heavy flow

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Infertility causes and diagnosis : ovulatory disorders

- regularity of cycles
- recognition of mucus

  stringy tenacious mucus
  consistency of raw egg white
  up to 10cm
  Spinnbarkeit

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Infertility causes and diagnosis : ovulatory disorders

- regularity of cycles
- recognition of mucus
- basal body temperature
- Serum progesterone in luteal phase

  Correct timing essential
  Day 21- 23 (5-7 days prior to expected period)
  > 30 nmol/l

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Infertility causes and diagnosis : by individual cause

Ovulatory disorders

- regularity of cycles
- recognition of mucus
- basal body temperature
- Serum progesterone in luteal phase
- Serum gonadotrophins (FSH, LH)
  in early follicular phase
    Day 1 - 5 measurement, in iu/L
    range 1 - 10 iu/L (the ratio should be 1:1)

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Infertility causes and diagnosis : by individual cause

Ovulatory disorders

- regularity of cycles
- recognition of mucus
- basal body temperature
- Serum progesterone in luteal phase
- Serum gonadotrophins in early follicular phase
- Ultrasound scans
    serial scans for follicle growth
    appearances of polycystic ovary syndrome

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PCOS

- Chronic anovulation
- Clinical/biochemical evidence of hyperandrogenism
- Polycystic ovaries

  2 out of 3 criteria to diagnose PCOS

  Rotterdam ESHRE/ASRM Consensus 2003

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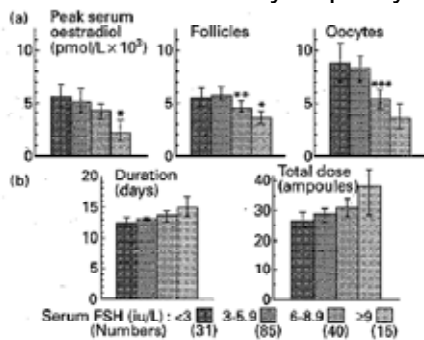## Midluteal serum progesterone as a criterion of ovulation

138 cycles, 72 patients, 21 untreated singleton conception cycles

mean progesterone	40.7 nmol/l (12.8 ng/ml)
95% CI	28-53 nmol/l (8.8-16.7 ng/ml)
range	27-53 nmol/l (8.5-16.7 ng/ml)

Hull et al. Fertil Steril. 1982

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Early follicular phase serum FSH as a marker of oocyte quality

Cahill et al, 1994

Fig. 2. Results as in Fig. 1 related to basal serum FSH concentrations: * P < 0·05; ** P < 0·01; *** P < 0·001.

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Infertility causes and diagnosis :

Investigating infertility: sperm disorders

Semen analysis
    Azoospermia / Severe oligospermia

Postcoital test
    Sperm dysfunction

Antisperm antibodies

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Infertility causes and diagnosis : male infertility

• Azoospermia / Severe oligospermia

Volume	2-5 ml
Count	$>20 \times 10^6$ /ml
Motility	>50%
Normal	>15%
MNSC	>1.5
MAR test	Negative

Infertility causes and diagnosis :

Investigating infertility: sperm disorders

Positive postcoital test
≥ 1 motile sperm per high power field about
12 hours after coitus

   good mucus penetration
   good sperm function
   satisfactory ejaculatory / coital function

Infertility causes and diagnosis :

Investigating infertility: tubal disorders

Chlamydia serology
   old infection   recent infection
   IFT : ≥ 1 in 256   CFT : ≥ 1 in 8

Hysterosalpingography

Infertility causes and diagnosis : tubal damage

- Laparoscopy dye test & Hysteroscopy
- Hysterosalpingography (HSG)

    painful procedure
    follicular phase to avoid pregnancy
    not widely accepted by clinicians

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Infertility causes and diagnosis : by individual cause

Tubal damage
- Laparoscopy / Hysteroscopy
- Hysterosalpingography
- Selective salpingography
    relatively new
    not universally accepted
    allows cannulation of a single tube

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Infertility causes and diagnosis : by individual cause

Tubal damage
- Laparoscopy / Hysteroscopy
- Hysterosalpingography
- Selective salpingography
- Contrast ultrasonography
  (HyCoSy – Hysterosalpingo Contrast Sonography)
    also relatively new
    not universally accepted

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Infertility causes and diagnosis : by individual cause

Tubal damage

- Laparoscopy / Hysteroscopy
- Hysterosalpingography
- Selective salpingography
- Contrast ultrasonography
- Chlamydia serology

old infection   recent infection

IFT : ≥1 in 512   CFT : ≥1in 8

Infertility causes and diagnosis :

Investigating infertility: unexplained infertility

Couples in whom these were normal
- mid-luteal serum progesterone ≥30nmol/l,
- normal thyroid function,
- normal early follicular phase
  FSH and LH concentrations,
- positive well-timed post-coital test
- normal laparoscopy
- normal seminal analysis results

Infertility causes and diagnosis:

Investigating infertility

- mid-luteal serum progesterone ≥30nmol/l,
- normal thyroid function,
- normal early follicular phase
  FSH and LH concentrations,
- positive well-timed post-coital test
- normal laparoscopy
- normal seminal analysis results