

Oestradiol

Pseudonyms: Estradiol; 17β -oestradiol; E2

Oestradiol is measured in the investigation of gonadal function and assessment of the pituitary/gonadal axis in conjunction with LH and FSH.

Oestradiol is secreted mainly by the ovary, but small amounts are produced by the adrenals and testes so low concentrations are also seen in males and post-menopausal females. In females during the menstrual cycle, oestradiol is secreted by the developing follicle gradually increasing during the follicular phase, reaching a peak shortly before ovulation. Post ovulation the corpus luteum switches to predominantly secrete progesterone, with concentrations of oestradiol falling. If fertilisation has not occurred, the corpus luteum regresses and the next menstrual cycle begins.

At puberty oestradiol levels rise in females producing the normal development of secondary sexual characteristics. Oestradiol aids the investigation of precocious puberty and gonadal dysgenesis.

Oestradiol is used in ovulation induction by the IVF unit, where the increase in oestradiol concentration correlates with the number of developing follicles post induction.

In males, oestradiol is used in the investigation of testicular dysfunction and gynaecomastia, and in the investigation of testicular or adrenal tumours.

General information

Collection container:

Adults – serum (with gel separator, 4.9mL brown top Sarstedt tube)

Paediatrics – lithium heparin plasma (1.2mL orange top Sarstedt tube)

Type and volume of sample:

The tubes should be thoroughly mixed before transport to the lab. 1mL whole blood is required as a minimum volume if only oestradiol is requested.

Specimen transport/special precautions:

Samples should not be taken from patients receiving therapy with high biotin doses (i.e. > 5 mg/day) until at least 8 hours following the last biotin administration.

Laboratory information

Method principle:

Division of Laboratory Medicine

Biochemistry

Oestradiol is analysed on the automated instruments by competitive immunoassay with electrochemiluminescence detection. The assay is standardised against CRM 6004a.

Biological reference ranges:

Male post pubertal: 41-159 pmol/L

Female post pubertal:

Follicular phase 45-854 pmol/L

Mid cycle 151-1461 pmol/L

Luteal 82-1251 pmol/L

Paediatric reference ranges:

Female Reference Intervals (pmol/L)		Male Reference Intervals (pmol/L)	
Age	RI	Age	RI
15 days - < 1 year	up to 78	15 days - < 1 year	up to 78
1 - < 9 years	up to 19	1 - < 11 years	up to 28
9 - < 11 years	up to 170	11 - < 13 years	up to 82
11 - < 12 years	up to 354	13 - < 15 years	up to 89
12 - < 14 years	21 - 664	15 - < 19 years	up to 132
14 - < 19 years	up to 996		
Tanner	RI	Tanner	RI
I	up to 59	I	up to 52
II	up to 83	II	up to 51
III	up to 323	III	up to 61
IV	32 - 541	IV	up to 118
V	53 - 807	V	48 - 115

Limitations of the assay:

The lower limit of quantitation of the assay is <100 pmol/L.

Paediatric samples with results <100 pmol/L are referred for analysis by LC-MS (liquid chromatography-mass spectrometry) to enable a quantitative result to be reported.

The assay range is 100-11,000 pmol/L and extends up to 110,000 pmol/L following automatic dilution on the analyser as required for IVF patients.

Turnaround times:

Results should be available the same working day.

Results for paediatric samples referred for LC-MS should be available within 7 days.

Division of Laboratory Medicine

Biochemistry

A request can be added on for this test to a sample collected no older than 3 days.

Clinical information

Factors known to significantly affect the results:

Steroid drugs may interfere with the assay. Due to the risk of cross reactivity, the assay should not be used when monitoring oestradiol levels in patients being treated with Fulvestrant.

Clinical decision points:

Results for females need to be interpreted for stage of the menstrual cycle with the peak in the mid cycle. High concentrations are seen in pregnancy, precocious puberty, gynaecomastia, and ovarian/adrenal/testicular tumours.

Low concentrations of oestradiol in combination with low LH and FSH are seen in hypopituitarism. Low concentrations of oestradiol are observed in patients taking the combined oral contraceptive pill, in premature ovarian failure, in post menopausal women and in other conditions such as anorexia nervosa.

Post ovulation induction, the increase in oestradiol concentration correlates with the number of developing follicles. Very high concentrations indicate risk of developing ovarian hyperstimulation syndrome if treatment is not discontinued.

(Last updated September 2020)