

F₂-Isoprostanes (F₂-IsoPs)

CPT Code **83789/82570**
Sample Type **Urine**

Order Code **C918**
Tube Type **Yellow Top**



F₂-IsoPs levels are increased with:

- Cigarette smoking
- Poor diet (including high red meat intake)
- Sedentary lifestyle

Description

F₂-IsoPs, prostaglandin-like compounds formed from the free radical-mediated oxidation of arachidonic acid¹, are the 'gold standard' for measuring oxidative stress in the body. F₂-IsoPs also have potent biological effects associated with inflammation and therefore may mediate chronic disease initiation and progression. Additionally, F₂-IsoPs may also act as potent vasoconstrictors² via thromboxane formation in the endothelium, and promote platelet activation resulting in thrombus formation³.

Clinical Use

The F₂-IsoPs test may be performed on individuals at risk of future cardiovascular disease due to lifestyle risks, or those with a family history of cardiovascular disease.

Clinical Significance

- Elevated levels of urinary F₂-IsoPs are seen in conditions associated with increased risk for atherosclerosis⁴ and certain forms of cancer^{5,6}.
- F₂-IsoPs are elevated in smokers⁷ and with increased intake of red meat⁸ and are decreased with exercise⁹.
- Lower steady state levels are associated with cardiovascular fitness and reduced risk.

Testing Frequency

The frequency of testing is determined by an individual's medical history, but may be performed yearly alongside a standard lipid panel in asymptomatic individuals with lifestyle risk factors.

Sample Type

The F₂-IsoPs test should be performed on a urine sample collected in a yellow top tube (without preservative).

Commercial Insurance or Medicare Coverage

Coverage guidelines, also known as NCD (National Coverage Determination) or LCD (Local Coverage Determination) have been established or posted by CMS (Medicare & Medicaid). Guidelines should be reviewed for coverage and limitations. Limited information has been provided by the majority of the larger carriers (Aetna, United HealthCare, Cigna, Blues).

Understanding Medical Necessity

The following ICD-9 codes for F₂-Isoprostanes are listed as a convenience for the ordering practitioner. The ordering practitioner should report the diagnosis code that best describes the reason for performing the test and provide the 4th and 5th ICD-9 digit as appropriate.

Diagnosis	Diagnosis Code
Diabetes Mellitus Type II or Unspecified, Not Stated as Uncontrolled	250.00
Diabetes Mellitus Type II or Unspecified, Uncontrolled	250.02
Pure Hypercholesterolemia	272.0
Mixed Hyperlipidemia	272.2
Other and Unspecified Hyperlipidemia	272.4
Benign Essential Hypertension	401.1
Unspecified Essential Hypertension	401.9
Coronary Atherosclerosis of Unspecified Type of Vessel, Native or Graft	414.00
Coronary Atherosclerosis of Native Coronary Artery	414.01
Other Abnormal Blood Chemistry	790.6

RELATIVE RISK

F₂-IsoPs (ng/mg)

<0.86 Low

≥0.86 High

Treatment Considerations

These treatment considerations are for educational purposes only. Specific treatment plans should be provided and reviewed by the treating practitioner.

✓ Assess LDL-C levels.

- If not at goal, consider lipid-lowering therapy, ideally with a statin-based regimen if not contraindicated.

✓ Assess smoking habits.

NOTE: Smoking cessation is essential as individuals who smoke are increased risk of heart disease and blood clots.

✓ Assess lifestyle habits.

- Consider diet/exercise/weight reduction efforts as appropriate.
- Consider improving cardiovascular conditioning. Individuals who are not conditioned may have increased oxidation, but this will reduce as conditioning improves.
- Consider optimal caloric intake as individuals who exercise a lot may not be taking in enough calories for their activity level. In short, they may be at risk for increased oxidation in their bodies due to lack of nutritional balance.

References

1. Morrow JD et al. A series of prostaglandin F₂-like compounds are produced in vivo in humans by a non-cyclooxygenase, free radical-catalyzed mechanism. *Proc Natl Acad Sci USA*. 1990; 87: 9383-9387.
2. Morrow JD et al. The F₂-isoprostane, 8-epi-prostaglandin F₂alpha, a potent agonist of the vascular thromboxane/endoperoxide receptor, is a platelet thromboxane/endoperoxide receptor antagonist. *Prostaglandins*. 1992; 44: 155-163.
3. Minuz P et al. The F₂-isoprostane 8-epiprostaglandin F₂alpha increases platelet adhesion and reduces the antiadhesive and antiaggregatory effects of NO. *Arterioscler Thromb Vasc Biol*. 1998; 18: 1248-1256.
4. Schwedhelm E et al. Urinary 8-iso-prostaglandin F₂alpha as a risk marker in patients with coronary heart disease: A matched case-control study. *Circulation*. 2004; 109: 843-848.
5. Rossner P Jr et al. Relationship between urinary 15-F_{2t}-isoprostane and 8-oxodeoxyguanosine levels and breast cancer risk. *Cancer Epidemiol Biomarkers Prev*. 2006; 15: 639-644.
6. Epplein M et al. Association of plasma micronutrient levels and urinary isoprostane with risk of lung cancer: The multiethnic cohort study. *Cancer Epidemiol Biomarkers Prev*. 2009; 18: 1962-1970.
7. Morrow JD et al. Increase in circulating products of lipid peroxidation (F₂-Isoprostanes) in smokers. Smoking as a cause of oxidative damage. *N Engl J Med*. 1995; 332: 1198-1203.
8. Tappel A. Heme of consumed red meat can act as a catalyst of oxidative damage and could initiate colon, breast and prostate cancers, heart disease and other diseases. *Med Hypotheses*. 2007; 68: 562-564.
9. Shi M et al. Effects of anaerobic exercise and aerobic exercise on biomarkers of oxidative stress. *Environ Health Prev Med*. 2007; 12: 202-208.

