

BLOOD SPOT TEST SPECIFICATIONS

Insulin-Like Growth Factor I

Clinical Information

Insulin-like growth factor I (IGF-1), also known as Somatomedin C, is a polypeptide hormone similar in structure to insulin and primarily produced in the liver. It is one of the main mediators of the actions of growth hormone in promoting muscular and skeletal growth. Because of its similarity to insulin, it weakly activates the insulin receptor and has insulin-like effects when present in large quantities. Blood levels of IGF-1 are low in young children, peaking during the pubertal growth spurt and then declining steadily with age.

Growth hormone (GH) stimulates IGF-1 production: unlike GH, levels of IGF-1 do not fluctuate throughout the day, and therefore IGF-1 levels reflect average daily GH levels. It is particularly important to test for IGF-1 during GH supplementation to ensure that levels are within the expected physiological range. IGF-1 production is affected by nutritional factors: low levels are seen in malnutrition or anorexia, and IGF-1 can be used as a sensitive indicator to monitor nutritional repletion. IGF-1 testing can be used by dentists to assess cervical stage of patients and determine whether a patient has attained or passed the peak pubertal growth, predict residual facial skeletal growth, and thus properly time orthodontic procedures. Low IGF-1 levels have been associated with increased cardiovascular disease risk, especially in individuals with diabetes, because of its role in vascular protection. Reference range levels in blood spot are 100–300 ng/mL, and are dependent on age.

References:

Diamandi A, Khosravi MJ, Mistry J, et al. Filter paper blood spot assay of human insulin-like growth factor I (IGF-I) and IGF-binding protein -3 and preliminary application in the evaluation of growth hormone status. *J Clin Endocrinol Metab.* 1998;83:2296-301.

Clemmons DR. Clinical utility of measurements of insulin-like growth factor 1. *Nat Clin Pract Endocrinol Metab.* 2006;2:436-46.

Masoud M, Masoud I, Kent RL Jr, et al. Assessing skeletal maturity by using blood spot insulin-like growth factor I (IGF-I) testing. *Am J Orthod Dentofacial Orthop.* 2008;134:209-16.

Conti E, Carrozza C, Capoluongo E, et al. Insulin-like growth factor-1 as a vascular protective factor. *Circulation.* 2004;110:2260-5.

Assay Method: ELISA

Intra-assay Precision

Intra-assay precision was determined by choosing three samples spanning the reference range, and analyzing them multiple times within the same run. Results are shown below:

Mean IGF-1 Concentration (ng/mL)	Standard Deviation	Coefficient of Variation (C.V. %)
126	11.5	9.1
238	23.0	9.7
270	22.5	8.3

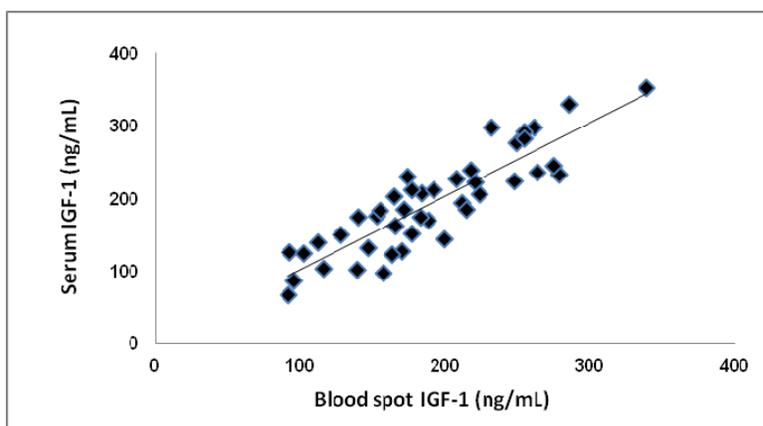
Inter-assay Precision

Inter-assay precision was determined by choosing three samples spanning the reference range, and analyzing them multiple times throughout different runs. Results are shown below:

Mean IGF-1 Concentration (ng/mL)	Standard Deviation	Coefficient of Variation (C.V. %)
121	10.6	8.7
247	20.5	8.3
294	20.3	6.9

Accuracy

To test the accuracy of the dried blood spot assay for IGF-1, dried blood spot samples collected at the same time as corresponding serum samples were analyzed by linear regression. Resulting correlation data are shown below ($R = 88$):



Analyte Stability

The dried blood spot samples are stable for more than 1 month at room temperature.

Specimen Collection

Kits for blood spot collection contain a filter paper collection card, finger lancets, an alcohol prep pad, sterile gauze, a band-aid, easy-to-follow instructions, and a mailer to return the sample for analysis.