

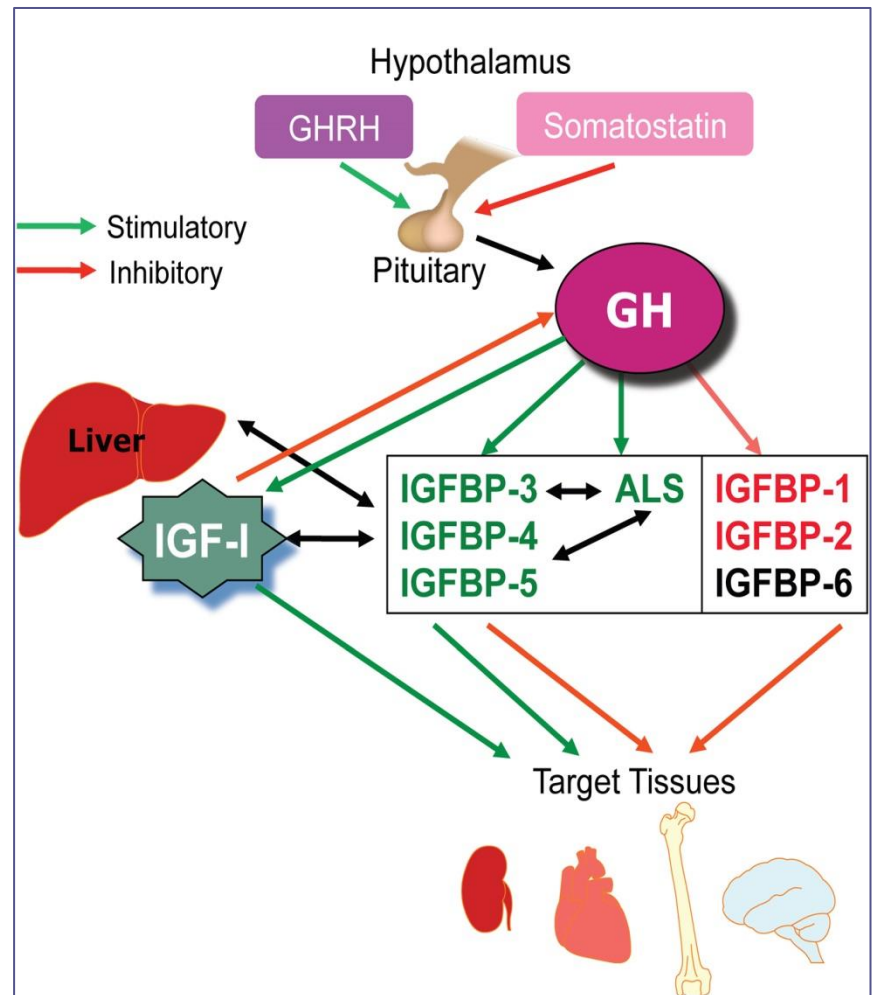
IGF-1 Results Interpretation

using SD score

Dr. Sophie Magen, PhD
Endocrinology Lab
Shaare'i Zedek Medical Centre
Jerusalem

GH - IGF-1 Axis

- Controls skeletal growth
- IGF bound to IGFBPs
- IGF-1 tyrosine kinase receptors –IGF1R
- Circulating IGF-1 reflect secretion of GH



Complexity of IGF-1 results

A. Discrepancies among assays

B. IGF-1 results vary by age, sex and pubertal stage

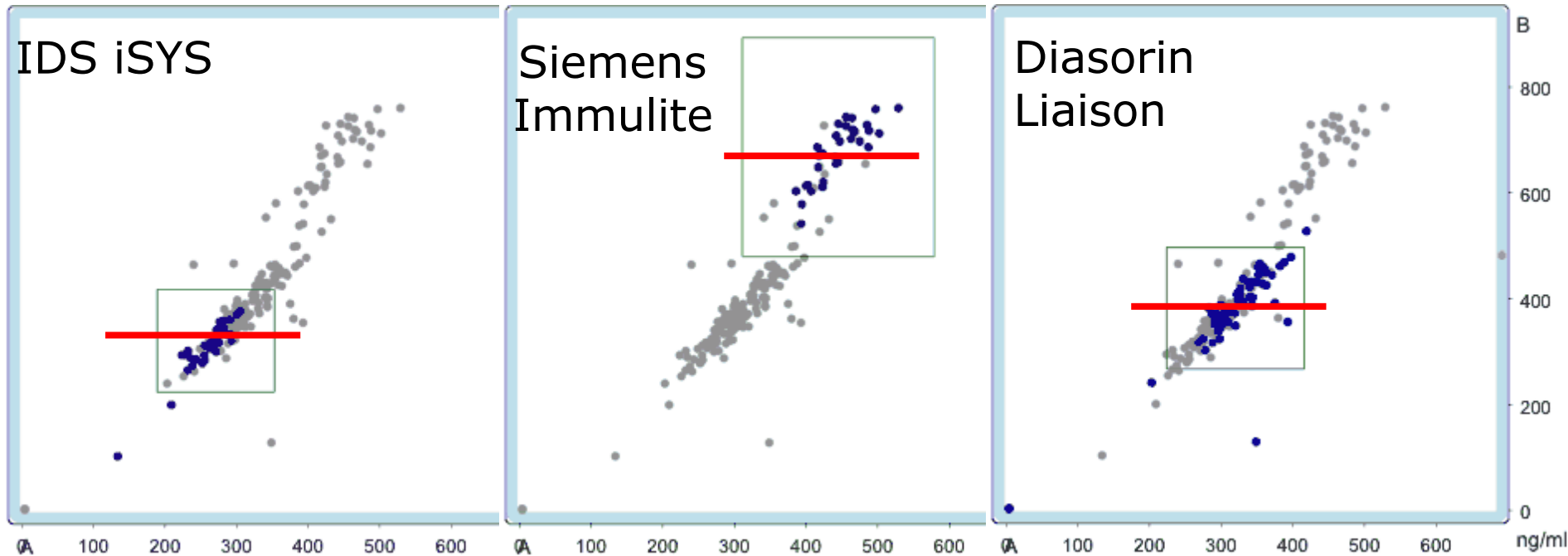
Complexity of IGF-1 results

A. Discrepancies among assays

Patients with GHD and acromegaly arrive with IGF-1 test values from different labs:

- IGF-1 concentrations should be independent of lab and assay
- Critical for correct diagnosis and treatment decisions

IGF-1 results using different methods



German EQAS 3/2013

Patient classification may vary substantially according to the assay technique

Reference intervals for IGF-1

same sample - 23 laboratories - 6 different assays

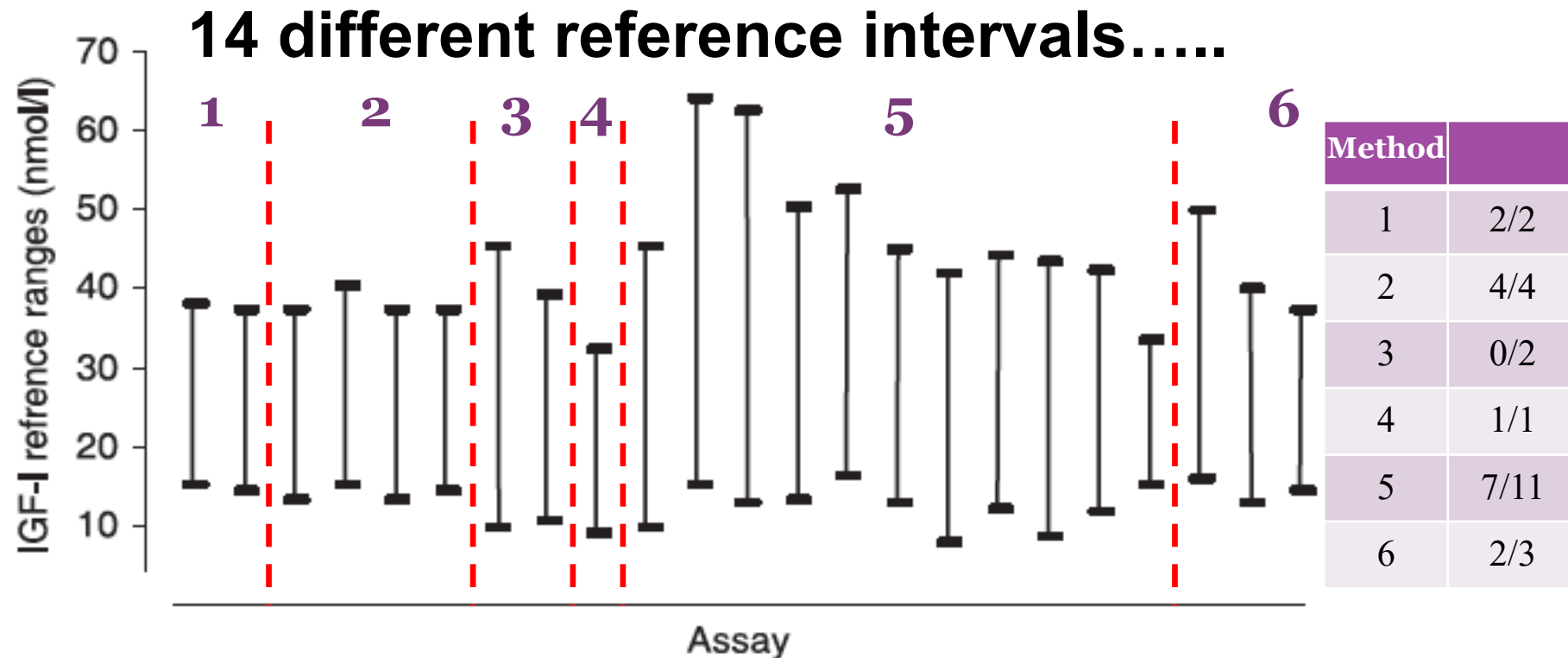


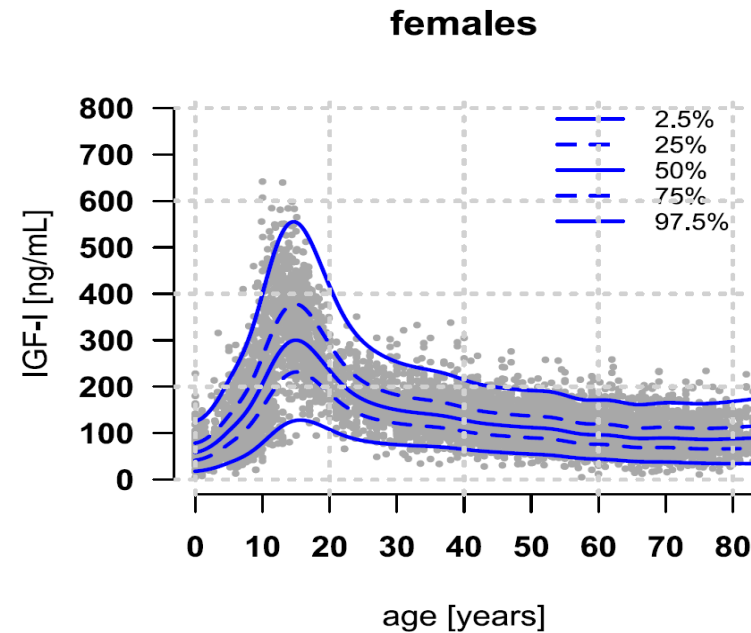
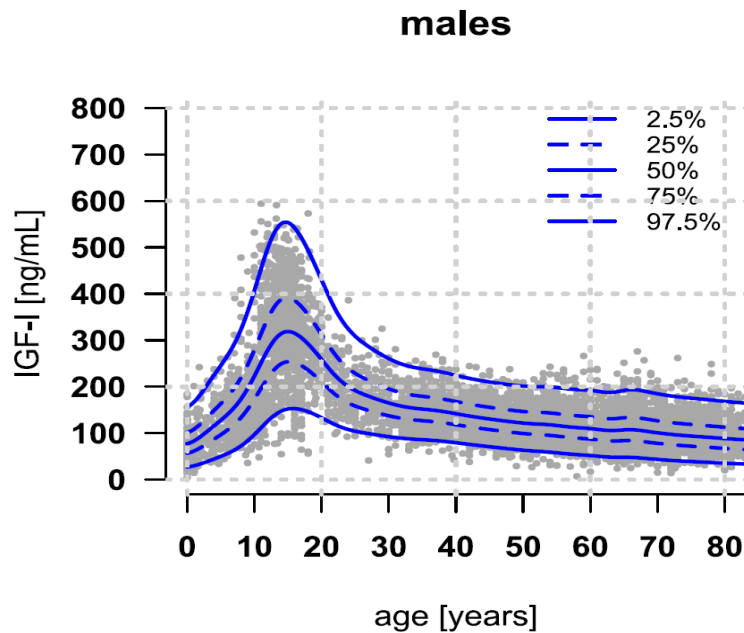
Fig. 3 IGF-I reference ranges for a 38-year-old female in different assays.

Complexity of IGF-1 results

B. IGF-1 results vary by age, sex and pubertal stage

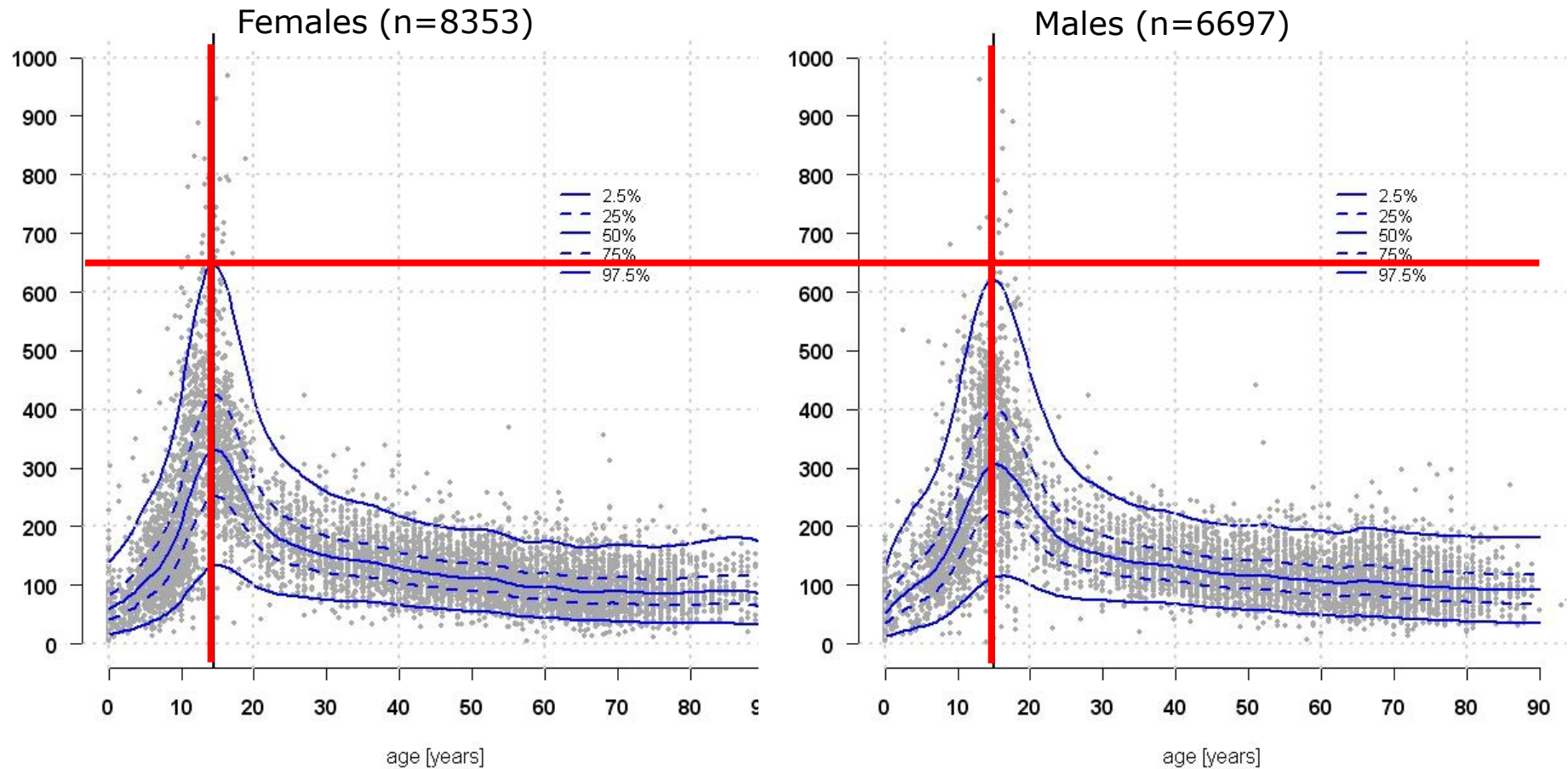
- Reference intervals must be defined accordingly each method
- Large reference population

B. age, sex, and pubertal stage



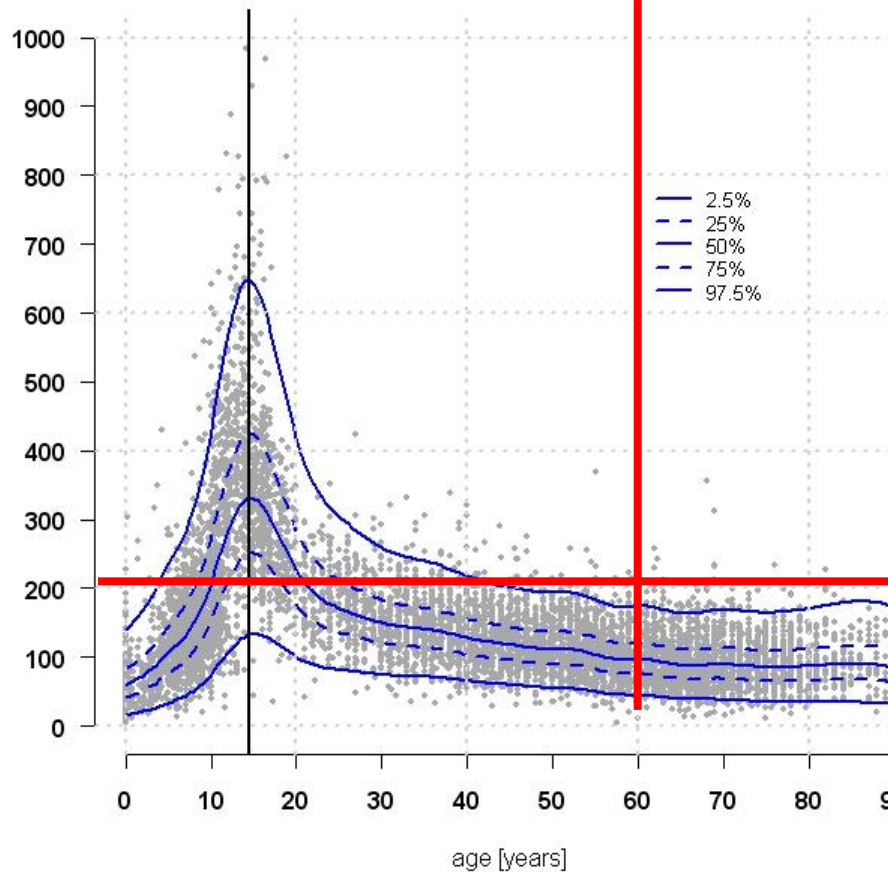
Bidlingmaier et al. JCEM 2014

IGF-1 peak slightly higher and six months earlier in girls

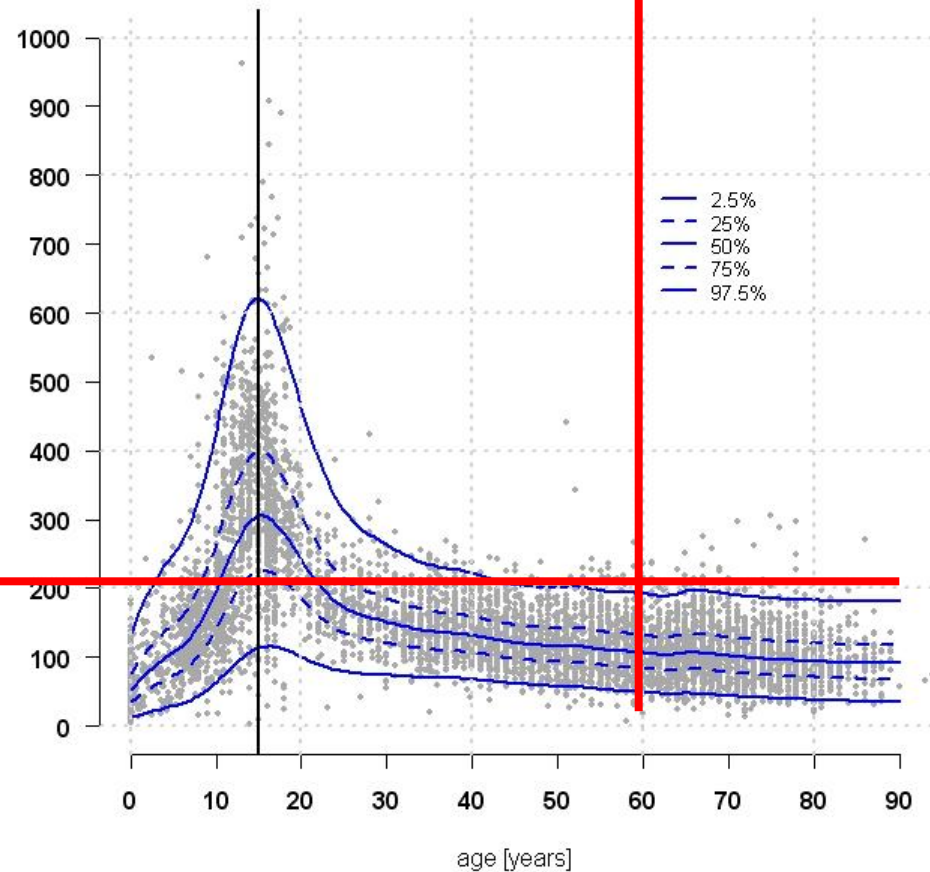


Upper limit of normal slightly higher in males at older age (>60)

Females (n=8353)



Males (n=6697)



Complexity of IGF-1 results

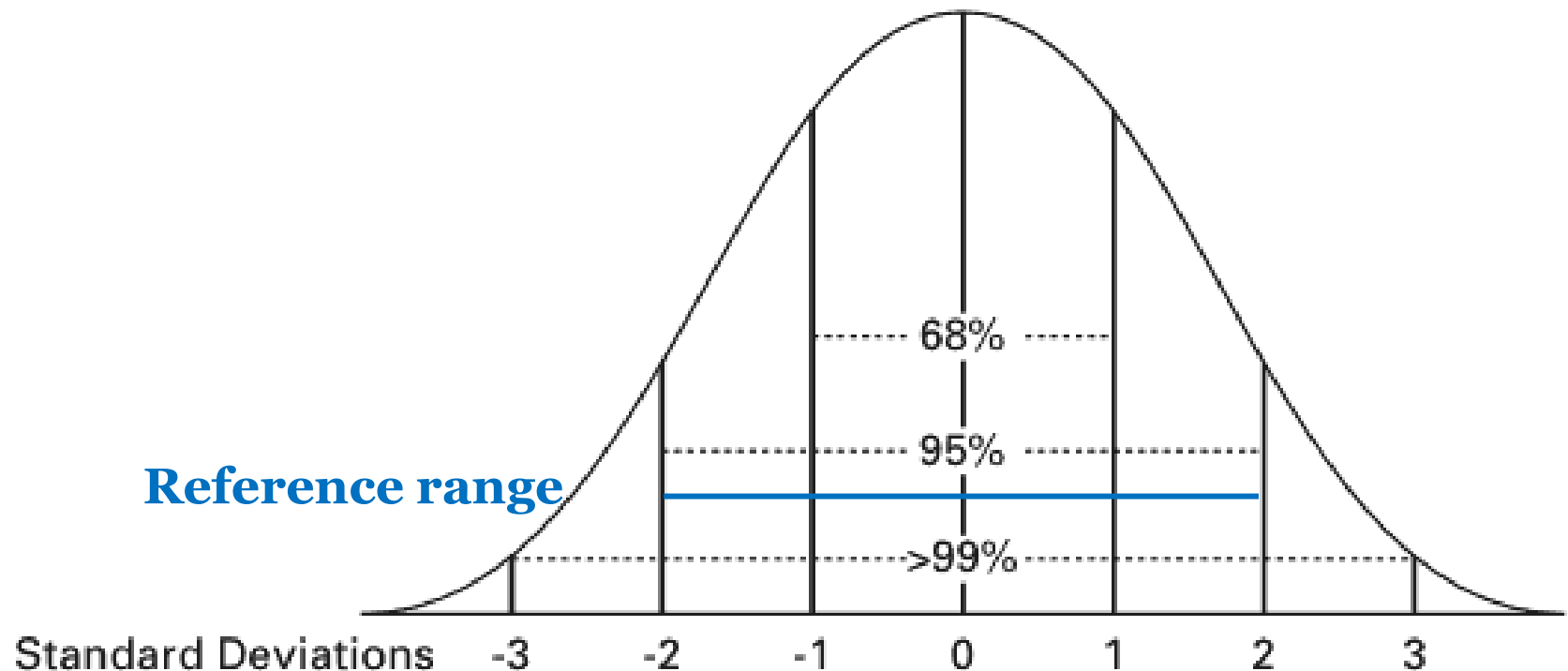
A. Discrepancies among assays

B. IGF-1 results vary by age, sex and pubertal stage

Need to present results
in a simple way

SD Score (SDS)

- Results are indicated as number of standard deviation above or below mean



Advantages of using standard deviation score(SDS):

1. Direct indication of relative position in reference population
2. Age and sex-independent
3. Dimensionless SD scores
4. Enables comparison of patients of various ages and results from different laboratories

IGF-1 SD score calculation

$$\underline{SDS = \{[(IGF1/M)^L] - 1\} / L \times S}$$

L (λ)- power transformation, **M** (μ) -mean

S (σ) –standard deviation for each age and sex

Select the kit used :

Select the sex : Male : ☐ Female : ☐

Select an age range :

or give an age : years

or a birth year :

Enter the IGF-I measured value : (in ng/ml)

or in nmo/l : (in nmol/l)

Given name and last name of the patient : (optional)

Pediatric IGF-1 SDS

iSYS (Immunodiagnostic Systems) – IGF-1 automated assay

- Standard 02/254
- Insensitive to the IGFBP
- Age and sex-adjusted reference intervals according to Tanner stages
- Multicenter study 15000 subjects , 0-94 years old , from USA, Canada and Europe (Bidlina et al. JCEM 2014)
- IDS-iSYS SDSpeed Calc software

המרכז הרפואי שערי צדק



מעבדה לאנדוקרינולוגיה - הורמונים ותרופות

מחלקה: בי"ח יום - ילדים
 זמן קליטה: 10/07/2019 13:15
 זמן דגימה: 10/07/2019 13:15
 מס. דגימה: 363328
 סוג דגימה: סרם

שם הנבדק
 מ. זהות
 מס. רשומה
 תאריך לידה: 08/03/2006
 מין: ז
 הערות:

ערכי ייחוס	יחידות	תוצאה	בדיקה
מבחן גירוי			
Arginine			
GH - basal (98/574)	ng/ml	0.1	
GH + 30 min (98/574)	ng/ml	4.1	
GH + 60 min (98/574)	ng/ml	2.5	
GH + 90 min (98/574)	ng/ml	0.5	
GH + 120 min (98/574)	ng/ml	1.4	
IGF1	nmol/L	12.5	X [.....] 18.2 - 69.8
IGF1 SD score		-2.68	X [.....] -2 - 2
results within the IGF1 reference interval (age & sex adjusted) have a Z score between -2 and +2			

המרכז הרפואי שערי צדק



מעבדה לאנדוקרינולוגיה - הורמונים ותרופות

מחלקה: בי"ח יום - ילדים
 זמן קליטה: 31/10/2019 09:17
 זמן דגימה: 31/10/2019 09:17
 מס. דגימה: 152686
 סוג דגימה: סחם

שם הנבדק
 מ. זהות
 מס. רשומה:
 תאריך לידה: 04/02/2010
 מין:
 הערות:

בדיקה	תוצאה	יחידות	ערכי ייחוס
IGF1	38.2	nmol/L	[.....X....] 11 - 47.4
IGF1 SD score	1.01		[.....X....] -2 - 2
results within the IGF1 reference interval (age & sex adjusted) have a Z score between -2 and +2			
TSH	1.67	mIU/L	[.X.....] 0.7 - 4.17
Free T4	1.11	ng/dL	[....X.....] 0.7 - 1.48

שיטה חדשה מפברואר 2017

Adult IGF-1 SDS

- Acromegaly is a chronic disorder caused by GH hypersecretion
- Measurement of IGF-1 levels in acromegaly is recommended as the initial screen
- Biochemical target goal is an age normalized serum IGF-1 value

Summary

- SD Score for IGF1 is a useful diagnostic tool
- IGF-1 SDS is predictive of abnormal GH secretion
- High-quality and methods specific IGF-1 reference ranges are essential
- Results interpretation is assay specific and based on clinical context