SYNTAX Score Management

Jin Seok Roh, RT

Asan Medical Center, Seoul, Korea

Introduction: Syntax Score:

Synthesis of Multiple Coronary Lesion Complexity Scoring Systems:

- **Coronary tree segments based on AHA classification modified for the ARTS I&II studies** (*Circulation 1975; 51:31-3 & Semin Interv Cardiol 1999; 4:209-19*)
- **Modified Leaman score** (*Circulation 1981; 63: 285-292*)
- **ACC/AHA lesions classification system** (*Circulation 2001;103:3019-3041*)
- **MEDINA classification** *(Rev Esp Cardiol. 2006;59(2):183-4)*
- **Total occlusion classification** (*J Am Coll Cardiol,1997;30:649-56*)

EuroInterv 2005;1:219-227

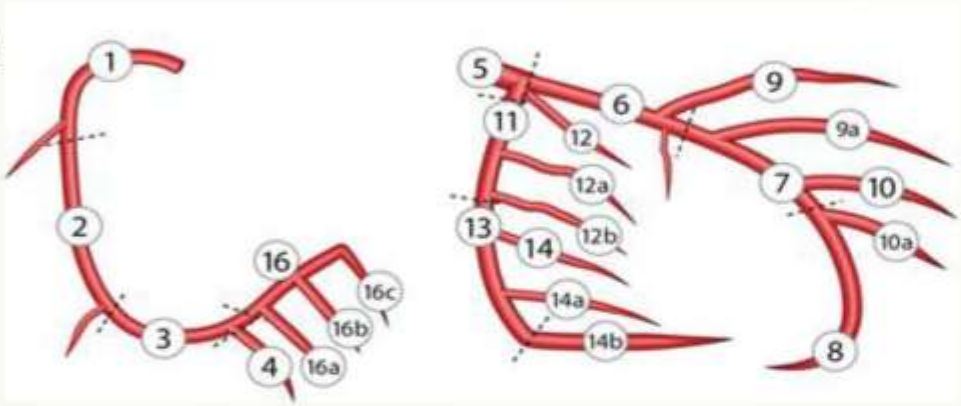
Syntax Score calculator (11 Questions)

- Q1: Dominance
- Q2: Specify diseased segment numbers
- Q3: Total Occlusion
- Q4: Trifurcation
- Q5: Bifurcation
- Q6: Aorta Ostial
- Q7: Severe Tortuosity
- Q8: Length
- Q9: Heavy Calcification
- Q10: Thrombus
- Q11: Diffusely diseased and narrowed segments

Syntax Score tutorial

Q1. Dominance

Right



Left

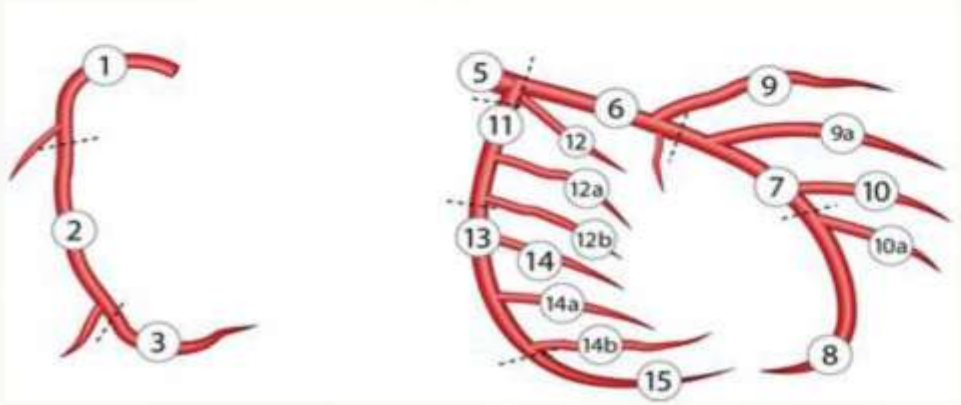


Table 1. Segment weighing factors

Segment No		Right dominance	Left dominance
1	RCA proximal	1	0
2	RCA mid	1	0
3	RCA distal	1	0
4	Posterior descending artery	1	n.a.
16	Posterolateral branch from RCA	0.5	n.a.
16a	Posterolateral branch from RCA	0.5	n.a.
16b	Posterolateral branch from RCA	0.5	n.a.
16c	Posterolateral branch from RCA	0.5	n.a.
5	Left Main	5	6
6	LAD proximal	3.5	3.5
7	LAD mid	2.5	2.5
8	LAD apical	1	1
9	First diagonal	1	1
9a	First diagonal[a]	1	1
10	Second diagonal	0.5	0.5
10a	Second diagonal[a]	0.5	0.5
11	Proximal circumflex artery	1.5	2.5
12	Intermediate/ anterolateral artery	1	1
12a	Obtuse marginal[a]	1	1
12b	Obtuse marginal[b]	1	1
13	Distal circumflex artery	0.5	1.5
14	Left posterolateral	0.5	1
14a	Left posterolateral[a]	0.5	1
14b	Left posterolateral[b]	0.5	1
15	Posterior descending	n.a.	1

for definitions segment numbers see Tutorial (www.syntaxscore.com)

Syntax Score: segment weight X multiplication factor

- Multiplication factor based on severity of stenosis (specific % stenosis is *not* used)

Total Occlusion

x 5

DS 100%

Significant lesion 50-99%

x 2

DS 50% - 99%

EuroInterv 2005;1:219-227

WWW.SYNTAXSCORE.COM

SYNTAX Score

Why Shoud We Syntax Socre?

Complexity Scoring System

2VD

SYNTAX Score : 10

≠

3VD

SYNTAX Score : 54.5

The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 MARCH 5, 2009 VOL. 360 NO. 10

Percutaneous Coronary Intervention versus Coronary-Artery Bypass Grafting for Severe Coronary Artery Disease

Patrick W. Serruys, M.D., Ph.D., Marie-Claude Morice, M.D., A. Pieter Kappetein, M.D., Ph.D., Antonio Colombo, M.D., David R. Holmes, M.D., Michael J. Mack, M.D., Elisabeth Ståhle, M.D., Ted E. Feldman, M.D., Marcel van den Brand, M.D., Eric J. Bass, B.A., Nic Van Dyck, R.N., Katrin Leadley, M.D., Keith D. Dawkins, M.D., and Friedrich W. Mohr, M.D., Ph.D., for the SYNTAX Investigators*

ENGLAND
of MEDICINE

MARCH 5, 2009 VOL. 360 NO. 10

ntervention versus Coronary-Artery
Severe Coronary Artery Disease

Claude Morice, M.D., A. Pieter Kappetein, M.D., Ph.D.,
es, M.D., Michael J. Mack, M.D., Elisabeth Ståhle, M.D.,
M.D., Eric J. Bass, B.A., Nic Van Dyck, R.N., Katrin Leadley, M.D.,
W. Mohr, M.D., Ph.D., for the SYNTAX Investigators*

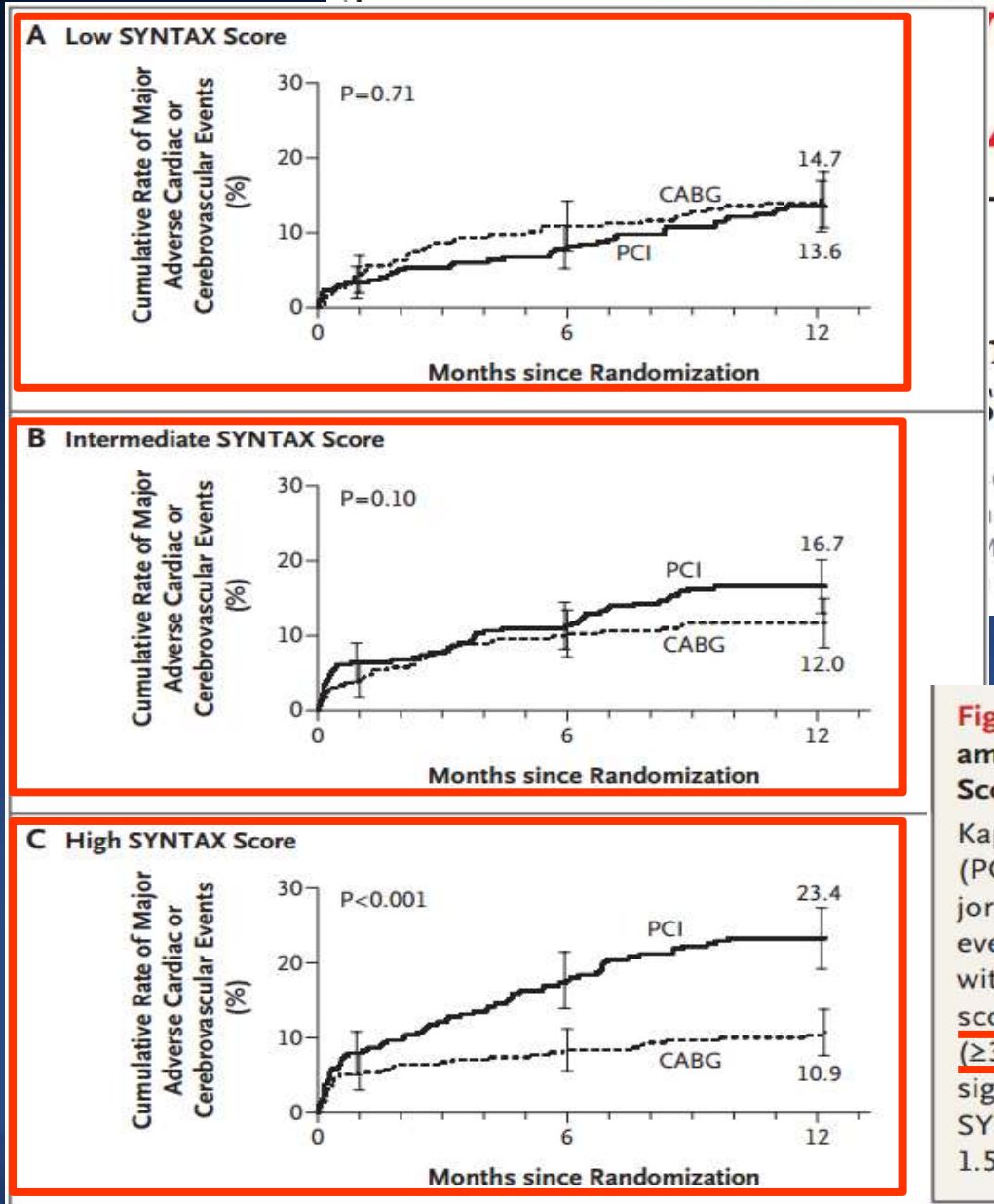


Figure 3. Rates of Major Adverse Cardiac or Cerebrovascular Events among the Study Patients, According to Treatment Group and SYNTAX Score Category.

Kaplan–Meier curves are shown for the percutaneous coronary intervention (PCI) group and the coronary-artery bypass grafting (CABG) group for major adverse cardiac or cerebrovascular events at 12 months. The 12-month event rates were similar between the two treatment groups for patients with low SYNTAX scores (0 to 22) (Panel A) or intermediate SYNTAX scores (23 to 32) (Panel B). Among patients with high SYNTAX scores (≥33, indicating the most complex disease), those in the PCI group had a significantly higher event rate at 12 months than those in the CABG group. SYNTAX scores were calculated at the core laboratory. The I bars indicate 1.5 SE. P values were calculated with the use of the chi-square test.

Evolution of the SYNTAX Score…

EuroIntervention

SYNTAX Score

Circulation Cardiovascular Interventions

Clinical SYNTAX Score

AHJ

Global Risk Classification

JACC Interventions

Global Risk

JACC

Functional SYNTAX Score

ACC.12

Logistic Clinical SYNTAX Score

PCR PARIS 2012

CABG SYNTAX Score

JACC Interventions

SYNTAX Myocardial Infarction Score

JACC Imaging

Compositional SYNTAX Score

EuroIntervention

Residual SYNTAX Score

Non-Invasive, Logistic, Functional, CABG, Residual, SYNTAX Score…

PRECOMBAT SYNTAX Score - AMC

The NEW ENGLAND JOURNAL of MEDICINE

Supplemental Table 2. Baseline Angiographic Characteristics of the Patients, According to Study Group. *

Random

Angiographic Characteristics	PCI (N=300)	CABG (N=300)	P value
Diseased vessels, N (%)			0.68
Left main only	27 (9.0)	34 (11.3)	
Left main plus single vessel disease	50 (16.7)	53 (17.7)	
Left main plus double vessel disease	101 (33.7)	90 (30.0)	
Left main plus triple vessel disease	122 (40.7)	123 (41.0)	
Bifurcation left main involvement	200 (66.9)	183 (62.2)	0.24
Heavy calcification of left main	17 (5.7)	14 (4.7)	0.58
Diameter stenosis of left main, N (%)			0.12
> 50% and ≤ 70%	160 (53.3)	141 (47.0)	
> 70%	140 (46.7)	159 (53.0)	
Right coronary artery disease, N (%)	149 (49.7)	159 (53.0)	0.41
Restenotic lesion, N (%)	1 (0.3)	2 (0.7)	0.56
Chronic total occlusion, N (%)	2 (0.7)	2 (0.7)	1.0
SYNTAX score, mean±SD §	24.4±9.4	25.8±10.5	0.09
SYNTAX score by tertiles, N (%)			0.75
Score ≤ 19	95 (32.9)	85 (31.6)	
Score > 19 and ≤ 29	105 (36.3)	93 (34.6)	
Score > 29	89 (30.8)	91 (33.8)	

Supplemental Table 8. Baseline Characteristics of the Patients, According to Treatment Group in the Registry Cohort.

Registry

Characteristics	PCI Registry (N=475)	CABG Registry (N=335)	P value
Angiographic characteristics			
Extent of disease vessel			<0.001
Left main only	74 (15.8)	2 (0.6)	
Left main plus single vessel disease	126 (27.0)	13 (4.1)	
Left main plus double vessel disease	171 (36.6)	39 (12.2)	
Left main plus triple vessel disease	96 (20.6)	265 (83.1)	
Involved location			0.22
Ostial and shaft involvement	158 (33.8)	96 (29.7)	
Distal bifurcation involvement	309 (66.2)	227 (70.3)	
Right coronary artery disease	156 (32.8)	287 (85.7)	<0.001
Restenotic lesion	8 (1.7)	1 (0.3)	0.41
Chronic total occlusion	16 (3.4)	5 (1.5)	0.10
EuroSCORE value	3.1±2.2	3.7±2.1	<0.001
SYNTAX score	22.5±9.9	37.8±11.9	<0.001
Postprocedural hospital stay, days	2.3±17.4	10.9±26.7	<0.001

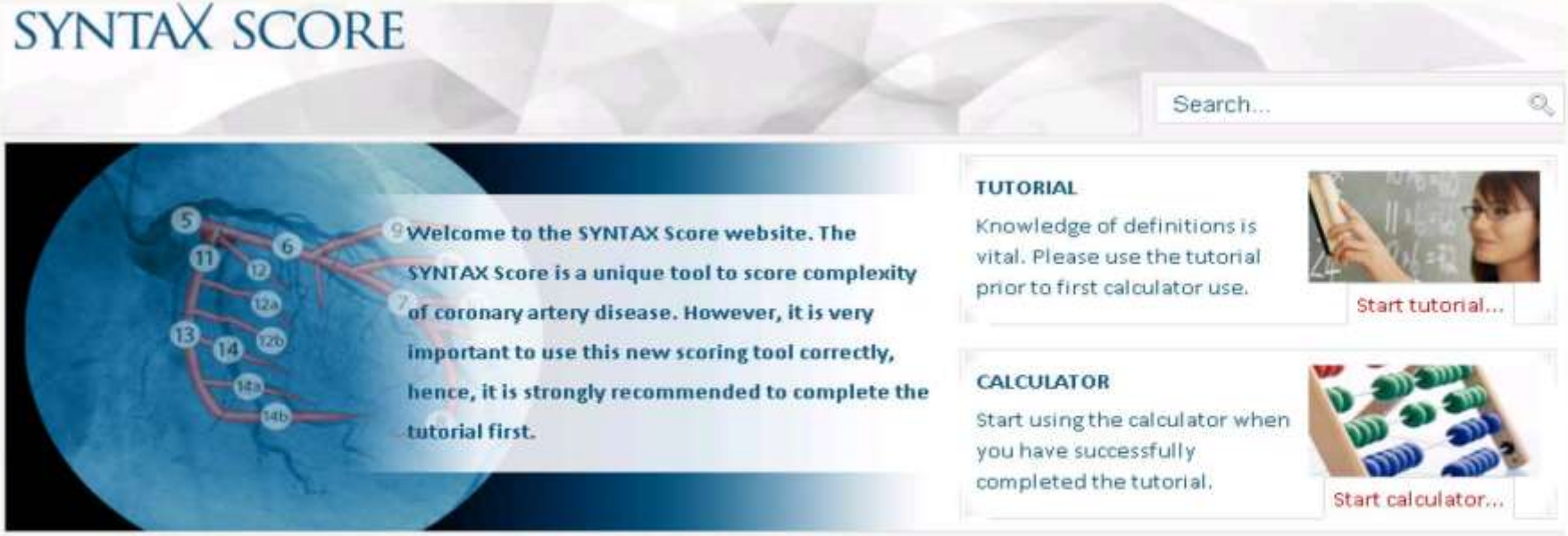
Syntax Score - AMC

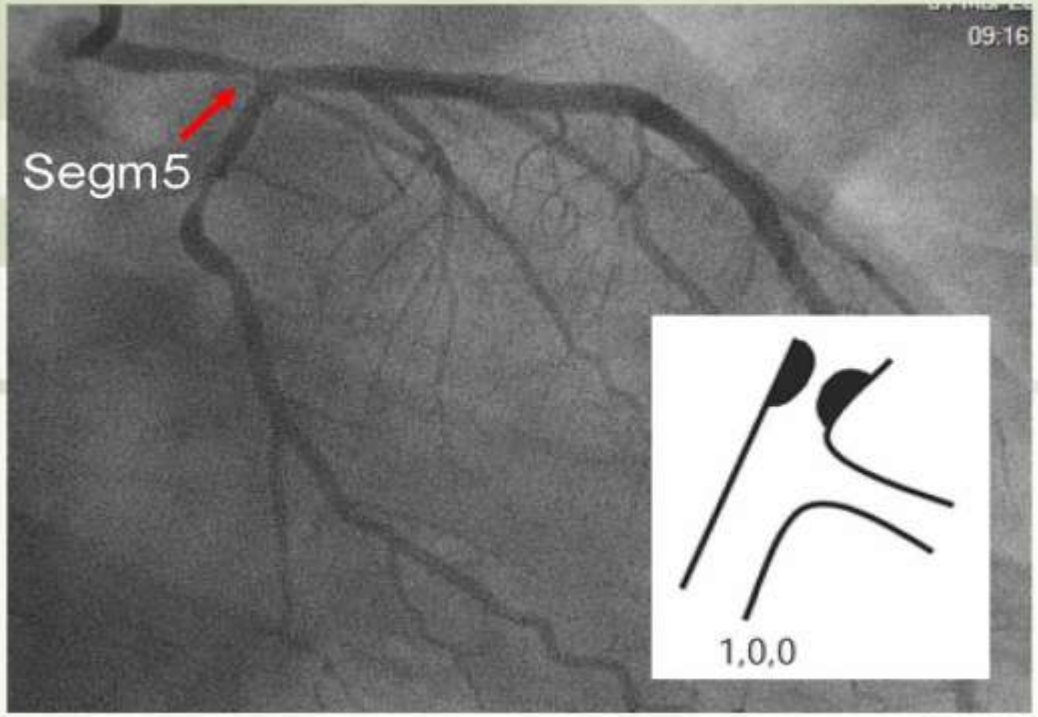
Random Trial

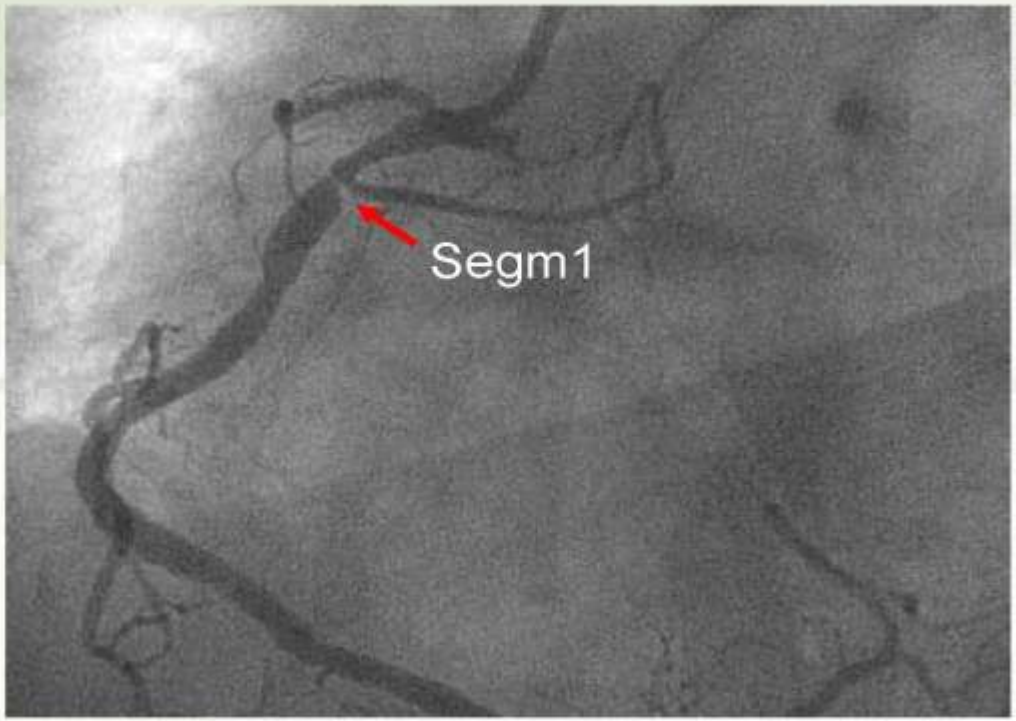
Balance Group

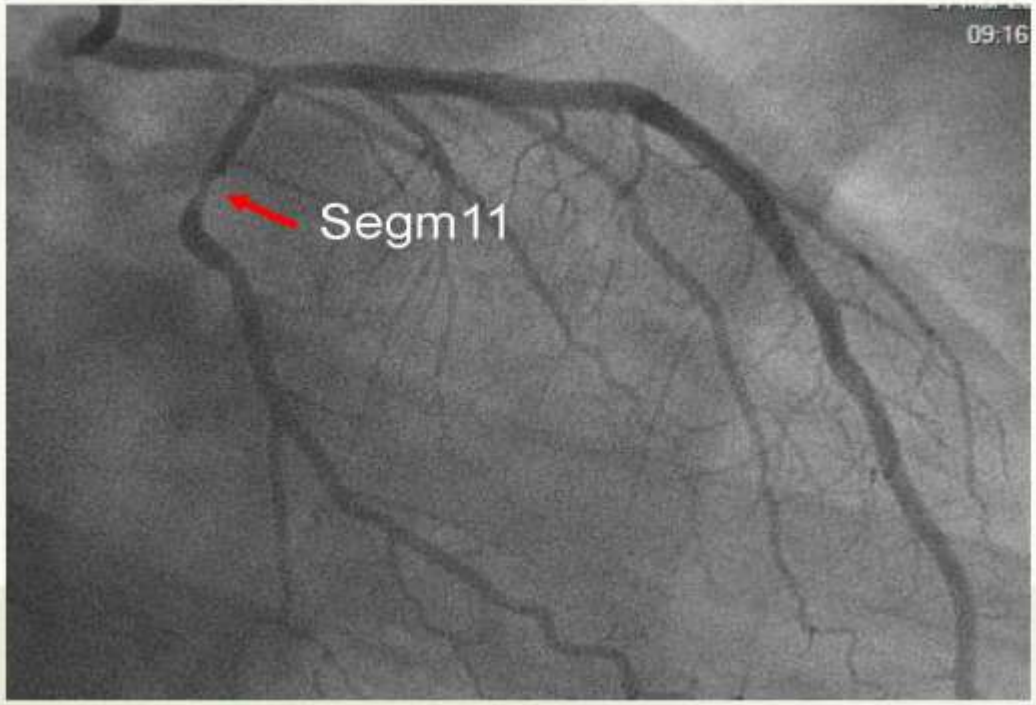
CARDIALYSIS | Clinical Trial Management and Core Laboratories

SYNTAX SCORE Calculator
Live Demonstration









Total Syntax Score: 18

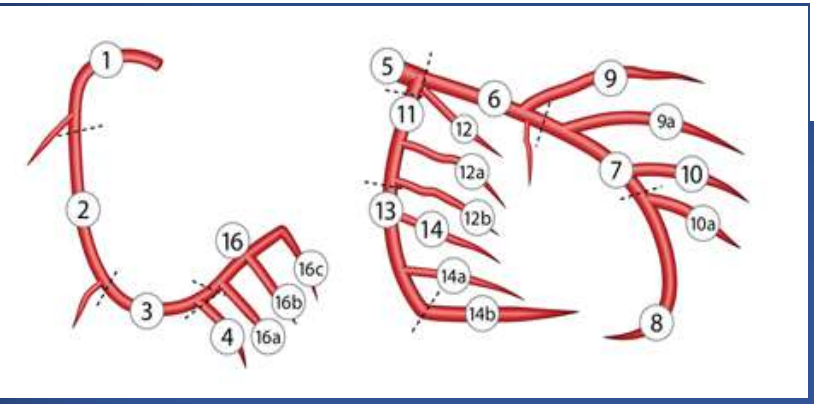
Lesion1: Left-main bifurcation (Medina 100)

Lesion2: Segment 11 (+ tortuosity)

Lesion3: Segment 1

SYNTAX SCORE Calculator

		Lesions:	1	2	3
	Segments:				
RCA	RCA proximal	1	v		
	RCA mid	2			
	RCA distal	3			
	Posterior descending	4			
	Posterolateral from RCA	16			
	Posterolateral from RCA	16a			
	Posterolateral from RCA	16b			
	Posterolateral from RCA	16c			
LM	Left main	5			
LAD	LAD proximal	6			
	LAD mid	7		v	
	LAD apical	8			
	First diagonal	9			
	Add. first diagonal	9a			
	Second diagonal	10			
	Add. second diagonal	10a			
LCX	Proximal circumflex	11			v
	Intermediate/anterolateral	12			
	Obtuse marginal	12a			
	Obtuse marginal	12b			
	Distal circumflex	13			
	Left posterolateral	14			
	Left posterolateral	14a			
	Left posterolateral	14b			



4. Total occlusion (T.O.)
- a. (•) No
- b. ( ) Yes:

5. Trifurcation
- a. (•) No
- b. ( ) Yes

6. Bifurcation
- a. (•) No
- b. ( ) Yes

7. Aorto Ostial lesion
- a. (•) No
- b. ( ) Yes

8. Severe Tortuosity
- a. (•) No
- b. ( ) Yes

9. Length >20 mm
- a. ( ) No
- b. (•) Yes

10. Heavy calcification
- a. (•) No
- b. ( ) Yes

11. Thrombus
- a. (•) No
- b. ( ) Yes

4. Total occlusion (T.O.)
- a. (•) No
- b. ( ) Yes:

5. Trifurcation
- a. (•) No
- b. ( ) Yes

6. Bifurcation
- a. ( ) No
- b. (•) Yes

Bifurcation angulation (betw main vessel and side branch
- a. (•) No
- b. ( ) Yes

8. Severe Tortuosity
- a. (•) No
- b. ( ) Yes

9. Length >20 mm
- a. ( ) No
- b. (•) Yes

10. Heavy calcification
- a. ( ) No
- b. (•) Yes

11. Thrombus
- a. (•) No
- b. ( ) Yes

4. Total occlusion (T.O.)
- a. ( ) No
- b. (•) Yes:

I. Indicate the first segment number of the T.O.

LCX	Proximal circumflex	11	(•)

II. is Age of T.O. > 3 months?
1. ( ) No
2. (•) Yes
3. ( ) Unknown

III. Blunt stump?
1. ( ) No
2. (•) Yes

IV. Bridging?
1. (•) No
2. ( ) Yes

V. Specify the first segment number beyond the total occlusion that visualized by **antegrade or retrograde** contrast.

	Segment numbers:	Segment visualized by contrast:
	none	( )
If, T.O. in segment 11	11	( )
	13	(•)
	14	( )

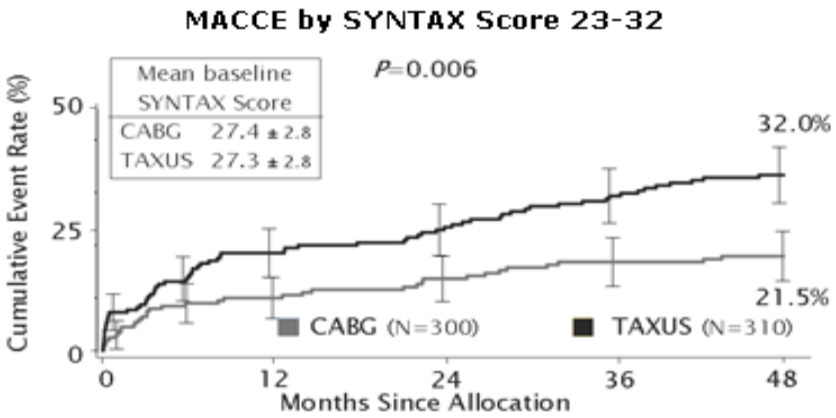
VI. Is there a sidebranch at the origin of the occlusion?
1. (•) No
2. ( ) Yes, all sidebranches <1.5mm
3. ( ) Yes, all sidebranches >=1.5mm
4. ( ) Yes, both sidebranches <1.5mm and >=1.5mm are involve

7. Aorto Ostial lesion
- a. (•) No
- b. ( ) Yes

8. Severe Tortuosity
- a. (•) No
- b. ( ) Yes

10. Heavy calcification
- a. ( ) No
- b. (•) Yes

11. Thrombus
- a. (•) No
- b. ( ) Yes

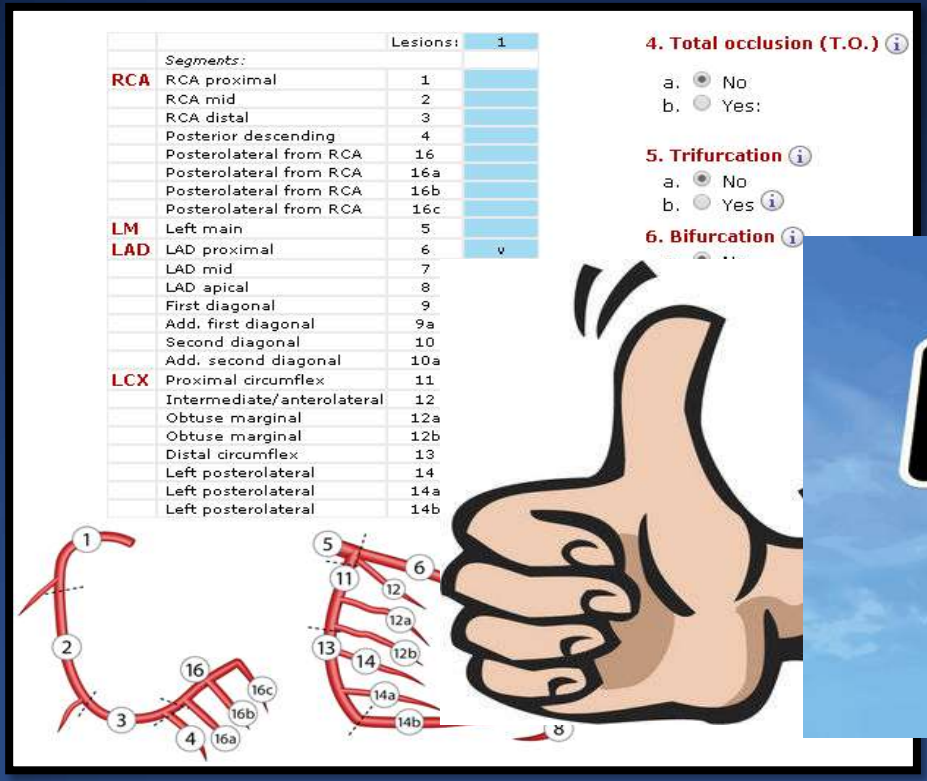


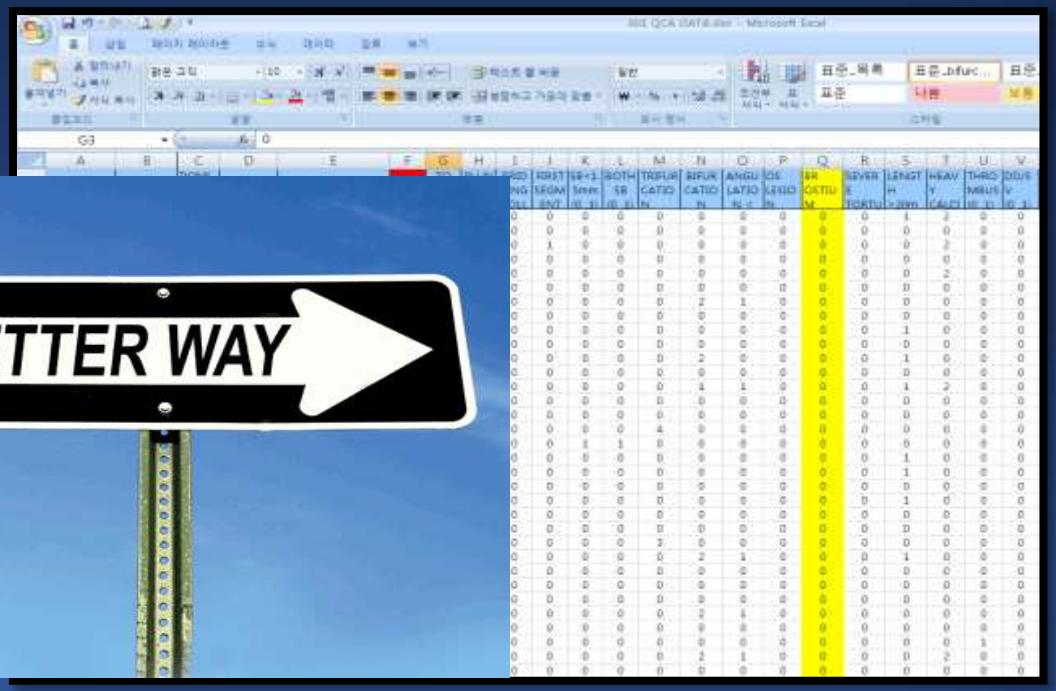
The cumulative MACCE rate is displayed for the SYNTAX Trial group this score corresponds to.

Summary

Lesion 1	
(segment 1): 1x2=	2
Length >20 mm	1
Sub total lesion 1	*3*
Lesion 2	
(segment 7): 2.5x2=	5
Bifurcation Type: Medina 1,1,1:	2
Length >20 mm	1
Heavy calcification	2
Sub total lesion 2	*10*
Lesion 3	
segment number(s)	
(segment 11): 1.5x5=	7.5
Age T.O. is yes	1
+ Blunt stump	1
the first segment beyond the T.O. visualized by contrast: 13	0
Heavy calcification	2
Sub total lesion 3	*11.5*
TOTAL:	*24.5*

What is Better

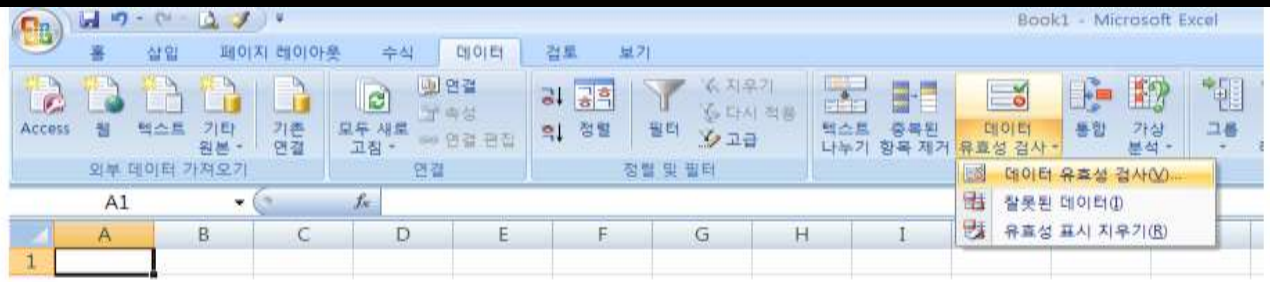




Web Calculator

Spread Sheet(Excel)
Database Program(ACESS, mySQL)

Input Limit



Serial	Hospital ID	Dominance	No Lesion	Segment	Segment No	Seg Score	Total Occlusion	TO AGE	TO stump	TO Bridging	TO visual	TO SB	Trifur	Bifur	Angulation	Ostial Lesion	Tortuosity	Length 20>	Calcific	Thrombus	DDS1	DDS2	Lesion Score
B01R00001	12345678	0	5	1RCAPROXIMAL																			

- Segment Select

- [x] 1. RCA PROXIMAL
- [ ] 2. RCA MID
- [ ] 3. RCA DISTAL
- [ ] 4. PDA[ ]
- [ ] 16. PL FROM RCA
- [ ] 16(a). PL FROM RCA
- [ ] 16(b). PL FROM RCA
- [ ] 16(c). PL FROM RCA
- [ ] 5. LEFT MAIN
- [ ] 6. LAD PROXIMAL
- [ ] 7. LAD MID
- [ ] 8. LAD APICAL
- [ ] 9. FIRST DIAGONAL
- [ ] 9(a). FIRST DIAGONAL(a)
- [ ] 10. SECOND DIAGONAL
- [ ] 10(a). SECOND DIAGONAL(a)
- [ ] 11. LCX PROXIMAL
- [ ] 12. INTERMEDIATE/ANTEROLATERAL ARTERY
- [ ] 12(a). OM(a)
- [ ] 12(b). OM(b)
- [ ] 13. LCX DISTAL
- [ ] 14. LEFT POSTEROLATERAL
- [ ] 14(a). LEFT POSTEROLATERAL
- [ ] 14(b). LEFT POSTEROLATERAL

- Trifurcation Select

- [x] 0
- [ ] 1.0.0.0
- [ ] 0.1.0.0
- [ ] 0.0.1.0
- [ ] 0.0.0.1
- [ ] 1.1.0.0
- [ ] 1.0.1.0
- [ ] 1.0.0.1
- [ ] 0.1.1.0
- [ ] 0.1.0.1
- [ ] 0.0.1.1
- [ ] 1.1.1.0
- [ ] 1.0.1.1
- [ ] 1.1.0.1
- [ ] 0.1.1.1

- Bifurcation Select

- [ ] 0
- [ ] 1.0.0
- [ ] 0.1.0
- [ ] 0.0.1
- [ ] 1.1.0
- [ ] 1.0.1
- [ ] 0.1.1
- [x] 1.1.1

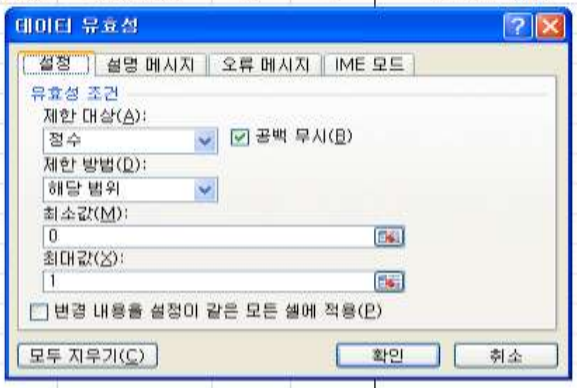
Input Select - Segment

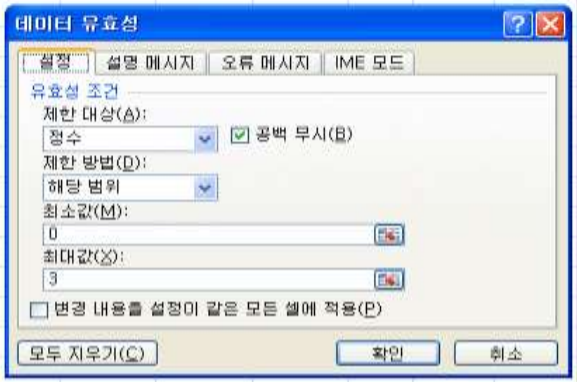
	A	B	C	D	E	F	G	H	I	J	K
1							Total Occlusion(TO)				
2	No.	Treatment_date	ID	DOMINAN (Right=0 Left=1)	No. LESION	SEGMENTS	TO (0 ,1)	TO AGE >3MONTH or UNKNOWN (0 ,1)	BLUNT STUMP (0 ,1)	BRIDGING COLLATERALS (0 ,1)	FIRST SEGMENT VISIBLE BEYOND TO (0 ,1,2,3)
250	698	08-Jan-09	27613146	0	3	9. FIRST DIAGONAL	0	0	0	0	0
251	698	08-Jan-09	27613146	0	3	1. RCA PROXIMAL	0	0	0	0	0
252	699	08-Jan-09	12768943	0	4	1. RCA PROXIMAL	0	0	0	0	0
253	699	08-Jan-09	12768943	0	4	13. LCX DISTAL	0	0	0	0	0
254	699	08-Jan-09	12768943	0	4	6. LAD PROXIMAL	0	0	0	0	0
255	699	08-Jan-09	12768943	0	4	7. LAD MID	0	0	0	0	0
256	699	08-Jan-09	12768943	0	4	9. FIRST DIAGONAL	0	0	0	0	0
257	700	09-Jan-09	30762479	0	1						
258						1. RCA PROXIMAL					
259						2. RCA MID					
260						3. RCA DISTAL					
261						4. PDA					
262						16. PL FROM RCA					
263						16(a). PL FROM RCA					
						16(b). PL FROM RCA					
						16(c). PL FROM RCA					

Data Validation (데이터 유효성검사)

G258

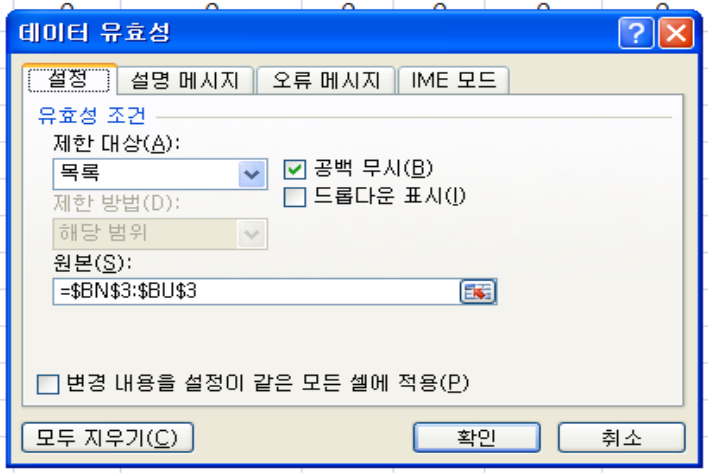
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
1							Total Occlusion(TO)								BIFURCATION				
2	No.	Treatment_date	ID	DOMINAN (Right=0 Left=1)	No. LESION	SEGMENTS	TO (0 ,1)	TO AGE >3MONTH or UNKNOWN (0 ,1)	BLUNT STUMP (0 ,1)	BRIDGING COLLATERALS (0 ,1)	FIRST SEGMENT VISIBLE BEYOND TO (0 ,1,2,3)	SB<1.5 mm (0 ,1)	BOTHSB (0 ,1)	TRIFURCATION MEDINA	BIFURCATION MEDINA	ANGULATION < 70° (0 ,1)	OS LESION (0 ,1)	BR OSTIUM LESION (0 ,1)	SEVERE TORTUSTY (0 ,1)
250	698	08-Jan-09	27613146	0	3	9. FIRST DIAGONAL	0	0	0	0	0	0	0	0	0	0	0	0	0
251	698	08-Jan-09	27613146	0	3	1. RCA PROXIMAL	0	0	0	0	0	0	0	0	0	0	0	0	0
252	699	08-Jan-09	12768943	0	4	1. RCA PROXIMAL	0	0	0	0	0	0	0	0	0	0	0	0	0
253	699	08-Jan-09	12768943	0	4	13. LCX DISTAL	0	0	0	0	0	0	0	0	0	0	0	0	0
254	699	08-Jan-09	12768943	0	4	6. LAD PROXIMAL	0	0	0	0	0	0	0	0	0	0	0	0	0
255	699	08-Jan-09	12768943	0	4	7. LAD MID	0	0	0	0	0	0	0	0	0	0	0	0	0
256	699	08-Jan-09	12768943	0	4	9. FIRST DIAGONAL	0	0	0	0	0	0	0	0	0	0	0	0	0
257	700	09-Jan-09	30762479	0	1	2. RCA MID	0	0	0	0	0	0	0	0					

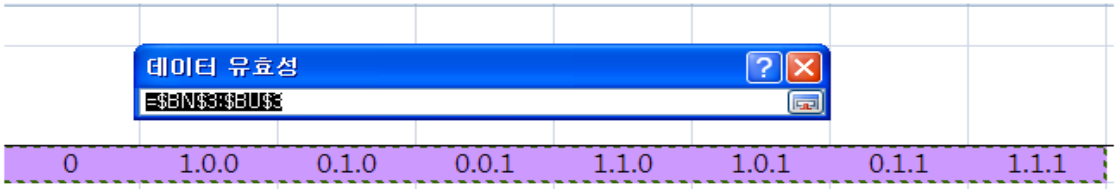




Data Validation (데이터 유효성검사)

	A	B	C	D	E	F	G	H	I	J	K	L	M	N
1							Total Occlusion(TO)							
2	No.	Treatment_date	ID	DOMINAN (Right=0 Left=1)	No. LESION	SEGMENTS	TO (0 ,1)	TO AGE >3MONTH or UNKNOW	BLUNT STUMP (0 ,1)	BRIDGING COLLATERALS (0 ,1)	FIRST SEGMENT VISIBLE	SB<1.5 mm (0 ,1)	BOTHSB (0 ,1)	TRIFURCATION MEDINA
239	696	07-Jan-09	18315998	0	6	12(a). OM(a)	0	0	0	0	0	0	0	0
240	696	07-Jan-09	18315998	0	6	7. LAD MID	0	0	0	0	0	0	0	0
241	696	07-Jan-09	18315998	0	6	6. LAD PROXIMAL	0	0	0	0	0	0	0	0
242	696	07-Jan-09	18315998	0	6	(a). FIRST DIAGONAL(a	0	0	0	0	0	0	0	0
243	696	07-Jan-09	18315998	0	6	2. RCA MID	0	0	0	0	0	0	0	0
244	697	08-Jan-09	28168416	0	5	13. LCX DISTAL	0	0	0	0	0	0	0	0
245	697	08-Jan-09	28168416	0	5	7. LAD MID	0	0						
246	697	08-Jan-09	28168416	0	5	9. FIRST DIAGONAL	0	0						
247	697	08-Jan-09	28168416	0	5	3. RCA DISTAL	0	0						
248	697	08-Jan-09	28168416	0	5	6. LAD PROXIMAL	0	0						
249	698	08-Jan-09	27613146	0	3	13. LCX DISTAL	0	0						
250	698	08-Jan-09	27613146	0	3	9. FIRST DIAGONAL	0	0						
251	698	08-Jan-09	27613146	0	3	1. RCA PROXIMAL	0	0						
252	699	08-Jan-09	12768943	0	4	1. RCA PROXIMAL	0	0						
253	699	08-Jan-09	12768943	0	4	13. LCX DISTAL	0	0						
254	699	08-Jan-09	12768943	0	4	6. LAD PROXIMAL	0	0						
255	699	08-Jan-09	12768943	0	4	7. LAD MID	0	0						
256	699	08-Jan-09	12768943	0	4	9. FIRST DIAGONAL	0	0						
257	700	09-Jan-09	30762479	0	1	2. RCA MID	0	0						

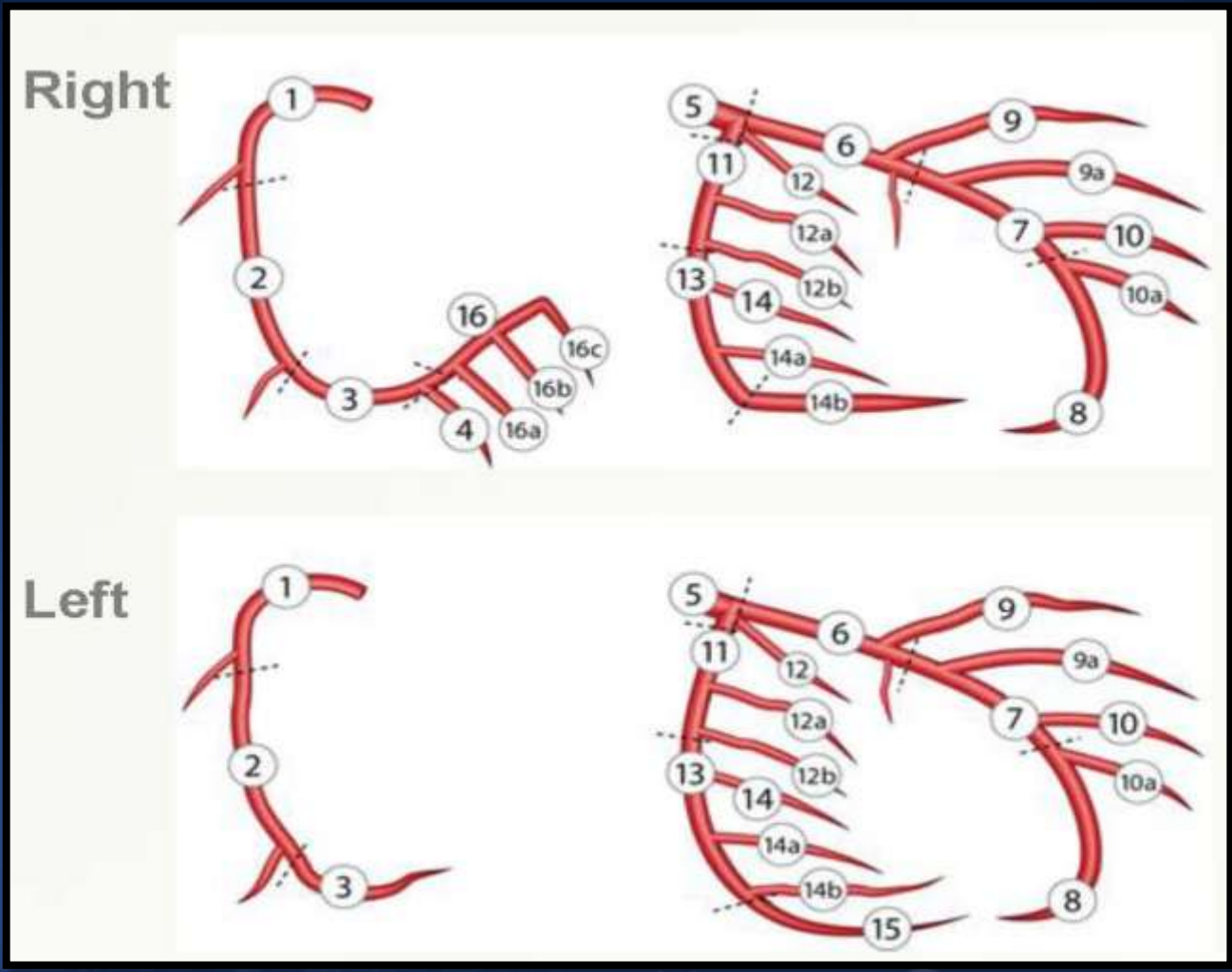




Segment Weighting Factors

Table 1. Segment weighing factors

Segment No		Right dominance	Left dominance
1	RCA proximal	1	0
2	RCA mid	1	0
3	RCA distal	1	0
4	Posterior descending artery	1	n.a.
16	Posterolateral branch from RCA	0.5	n.a.
16a	Posterolateral branch from RCA	0.5	n.a.
16b	Posterolateral branch from RCA	0.5	n.a.
16c	Posterolateral branch from RCA	0.5	n.a.
5	Left Main	5	6
6	LAD proximal	3.5	3.5
7	LAD mid	2.5	2.5
8	LAD apical	1	1
9	First diagonal	1	1
9a	First diagonal[a]	1	1
10	Second diagonal	0.5	0.5
10a	Second diagonal[a]	0.5	0.5
11	Proximal circumflex artery	1.5	2.5
12	Intermediate/ anterolateral artery	1	1
12a	Obtuse marginal[a]	1	1
12b	Obtuse marginal[b]	1	1
13	Distal circumflex artery	0.5	1.5
14	Left posterolateral	0.5	1
14a	Left posterolateral[a]	0.5	1
14b	Left posterolateral[b]	0.5	1
15	Posterior descending	n.a.	1



Segment Weighting Factors

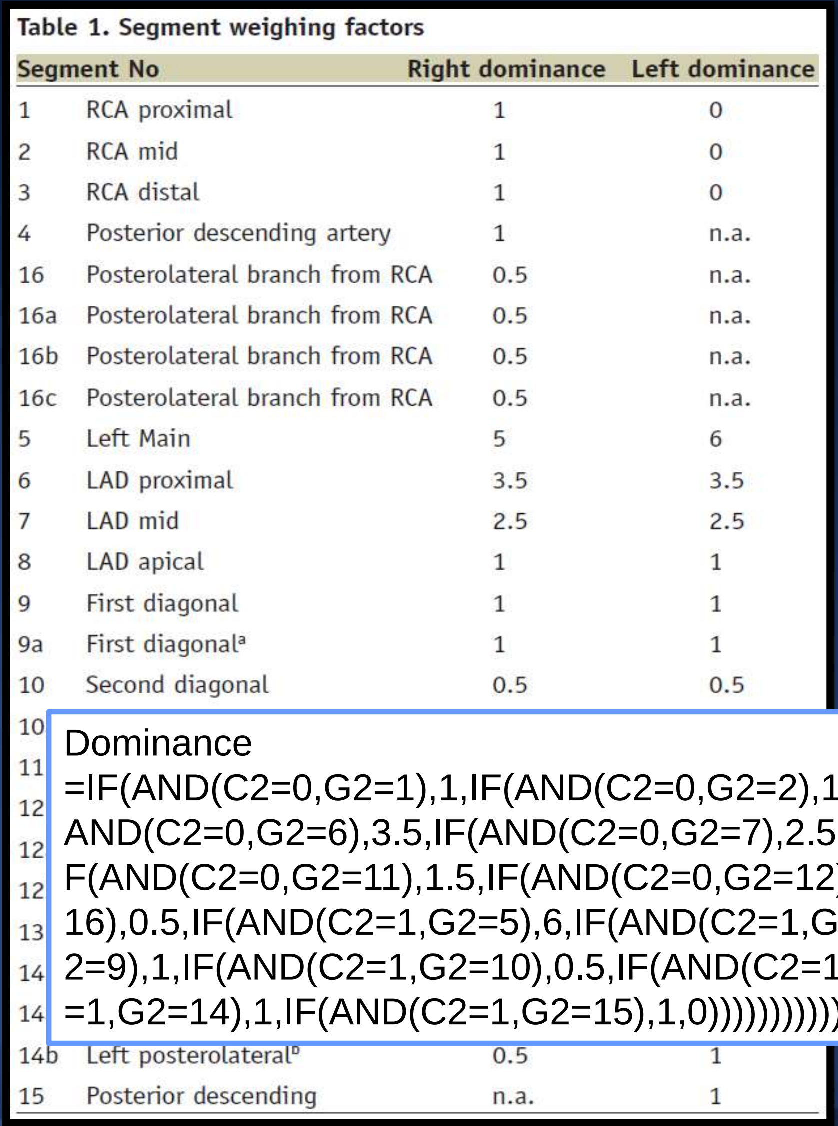


Table 1. Segment weighing factors

Segment No		Right dominance	Left dominance
1	RCA proximal	1	0
2	RCA mid	1	0
3	RCA distal	1	0
4	Posterior descending artery	1	n.a.
16	Posterolateral branch from RCA	0.5	n.a.
16a	Posterolateral branch from RCA	0.5	n.a.
16b	Posterolateral branch from RCA	0.5	n.a.
16c	Posterolateral branch from RCA	0.5	n.a.
5	Left Main	5	6
6	LAD proximal	3.5	3.5
7	LAD mid	2.5	2.5
8	LAD apical	1	1
9	First diagonal	1	1
9a	First diagonal[a]	1	1
10	Second diagonal	0.5	0.5
10			
11			
12			
12			
12			
13			
14			
14			
14b	Left posterolateral[b]	0.5	1
15	Posterior descending	n.a.	1

Excel function (함수)

Dominance

```
=IF(AND(C2=0,G2=1),1,IF(AND(C2=0,G2=2),1,IF(AND(C2=0,G2=3),1,IF(AND(C2=0,G2=4),1,IF(AND(C2=0,G2=5),5,IF(AND(C2=0,G2=6),3.5,IF(AND(C2=0,G2=7),2.5,IF(AND(C2=0,G2=8),1,IF(AND(C2=0,G2=9),1,IF(AND(C2=0,G2=10),0.5,IF(AND(C2=0,G2=11),1.5,IF(AND(C2=0,G2=12),1,IF(AND(C2=0,G2=13),0.5,IF(AND(C2=0,G2=14),0.5,IF(AND(C2=0,G2=16),0.5,IF(AND(C2=1,G2=5),6,IF(AND(C2=1,G2=6),3.5,IF(AND(C2=1,G2=7),2.5,IF(AND(C2=1,G2=8),1,IF(AND(C2=1,G2=9),1,IF(AND(C2=1,G2=10),0.5,IF(AND(C2=1,G2=11),2.5,IF(AND(C2=1,G2=12),1,IF(AND(C2=1,G2=13),1.5,IF(AND(C2=1,G2=14),1,IF(AND(C2=1,G2=15),1,0))))))))))))))))))))))))))
```

Segment weight X multiplication factor

Serial	Hospital ID	Dominance	No. Lesion	Segment	Seg No	Seg Score	Total Occlusion	TO AGE	TO stump	TO Bridging	TO visual	TO SB	Trifur	Bifur	Angulation	Ostial Lesion	Tortuosity	Length 20>	Calcific	Thrombus	DDNS1	DDNS2	Lesion Score
B01R00001	12345678	0	5	1RCAPROXIMAL	1	1																	
B01R00001	12345678	0	5	2RCAMID	2	1																	
B01R00001	12345678	0	5	4PDA	4	1																0	9
B01R00001	12345678	0	5	16aPLFROMRCA	16a	0.5																0	1
B01R00001	12345678	0	5	6LADPROXIMAL	6	3.5	2	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	9
B01R00002	87654321	0	5	1RCAPROXIMAL	1	1	2	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	3
B01R00002	87654321	0	5	3RCADISTAL	3	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
B01R00002	87654321	0	5	6LADPROXIMAL	6	3.5	2	0	0	0	0	0	0	2	0	0	0	1	0	0	0	0	10
B01R00002	87654321	0	5	9FIRSTDIAGONAL	9	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
B01R00002	87654321	0	5	11LCXPROXIMAL	11	1.5	2	0	0	0	0	0	0	1	1	0	0	1	2	0	0	0	8
B01R00003	55554444	1	3	3RCADISTAL	3	0	5	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	2
B01R00003	55554444	1	3	6LADPROXIMAL	6	3.5	2	1	0	0	0	0	0	2	1	0	0	0	2	0	0	0	12
B01R00003	55554444	1	3	9FIRSTDIAGONAL	9	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
B01R00004	43218765	1	4	2RCAMID	2	0	2	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	3
B01R00004	43218765	1	4	3RCADISTAL	3	0	5	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
B01R00004	43218765	1	4	12INTERMEDANTERO	12	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
B01R00004	43218765	1	4	6LADPROXIMAL	6	3.5	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7

=IF(AND(C2=0,G2=1),1,IF(AND(C2=0,G2=2),1,IF(AND(C2=0,G2=3),1,IF(AND(C2=0,G2=4),1,IF(AND(C2=0,G
(AND(C2=0,G2=7),2.5,IF(AND(C2=0,G2=8),1,IF(AND(C2=0,G2=9),1,IF(AND(C2=0,G2=10),0.5,IF(AND(C2=0
(C2=0,G2=12),1,IF(AND(C2=0,G2=13),0.5,IF(AND(C2=0,G2=14),0.5,IF(AND(C2=0,G2=16),0.5,IF(AND(C2=1,G2=5),6,IF(AND(C2=1,G2=6),3.5,IF
(AND(C2=1,G2=7),2.5,IF(AND(C2=1,G2=8),1,IF(AND(C2=1,G2=9),1,IF(AND(C2=1,G2=10),0.5,IF(AND(C2=1,G2=11),2.5,IF(AND(C2=1,G2=12),1,IF
(AND(C2=1,G2=13),1.5,IF(AND(C2=1,G2=14),1,IF(AND(C2=1,G2=15),1,0)))))))))))))))))))))))))))))

=(I2*J2)+SUM(K2:T2,V2:Y2)+COUNTA(Z2:AA2)

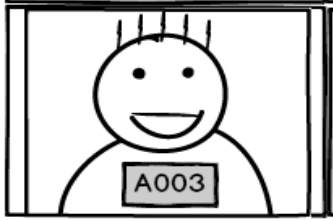
Dominance
=IF(AND(C2=0,G2=1),1,IF(AND(C2=0,G2=2),1,IF(AND(C2=0,G2=3),1,IF(AND(C2=0,G2=4),1,IF(AND(C2=0,G2=5),5,IF(AND(C2=0,G2=6),3.5,IF(AND(C2=0,G2=7),2.5,IF(AND(C2=0,G2=8),1,IF(AND(C2=0,G2=9),1,IF(AND(C2=0,G2=10),0.5,IF(AND(C2=0,G2=11),1.5,IF(AND(C2=0,G2=12),1,IF(AND(C2=0,G2=13),0.5,IF(AND(C2=0,G2=14),0.5,IF(AND(C2=0,G2=16),0.5,IF(AND(C2=1,G2=5),6,IF(AND(C2=1,G2=6),3.5,IF(AND(C2=1,G2=7),2.5,IF(AND(C2=1,G2=8),1,IF(AND(C2=1,G2=9),1,IF(AND(C2=1,G2=10),0.5,IF(AND(C2=1,G2=11),2.5,IF(AND(C2=1,G2=12),1,IF(AND(C2=1,G2=13),1.5,IF(AND(C2=1,G2=14),1,IF(AND(C2=1,G2=15),1,0)))))))))))))))))))))))))))))

=(I2*J2)+SUM(K2:T2,V2:Y2)+COUNTA(Z2:AA2)

Lesion Score → Patient Score

Lesion No	Seg	Seg No	Lesion Score
1	pRCA	Seg-1	5
2	dRCA	Seg-3	3
3	pLAD	Seg-6	8
4	dLCX	Seg-11	2

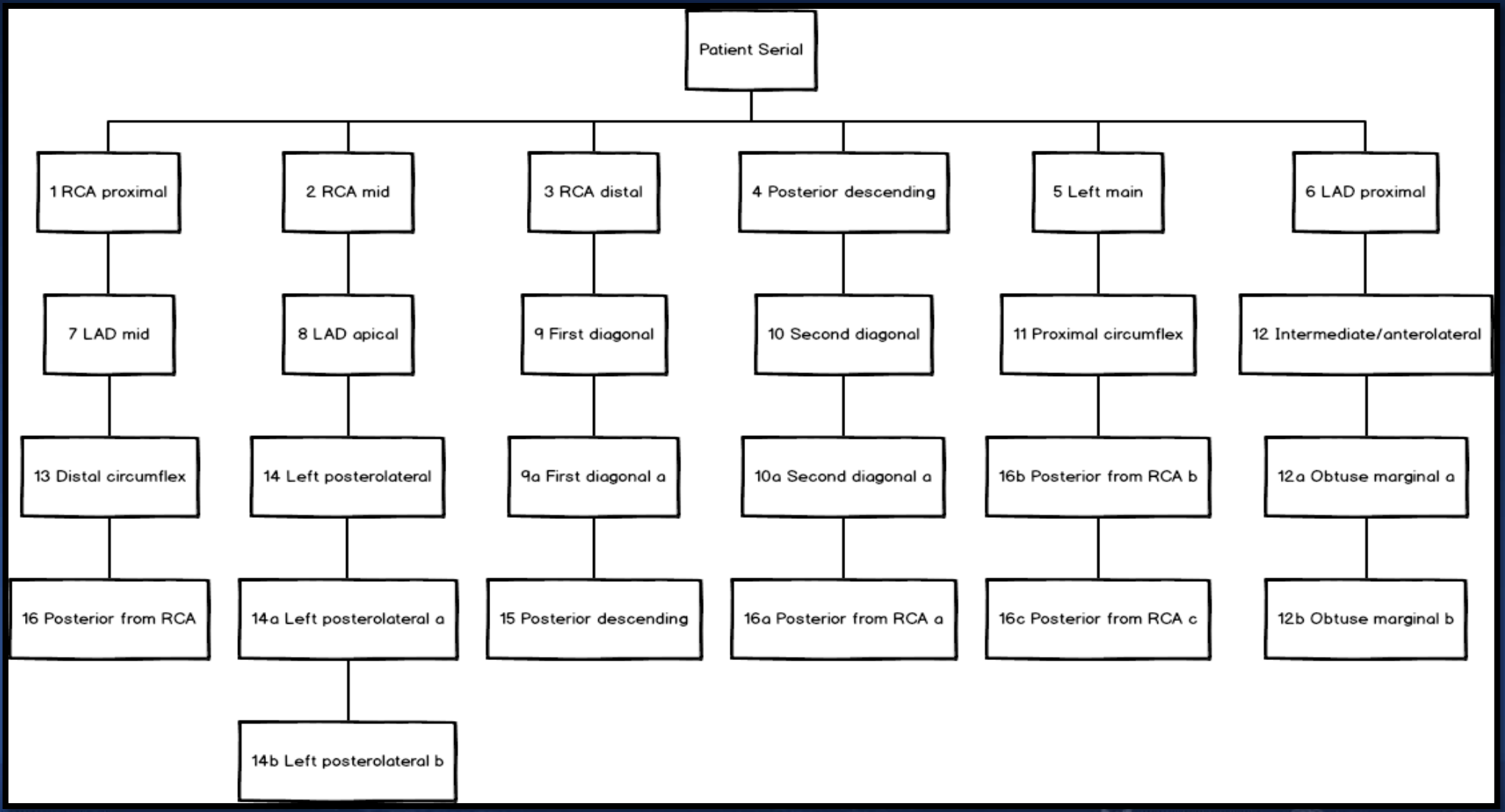
Lesion No	Seg	Seg No	Lesion Score
1	mRCA	Seg-2	4
2	Leftmain	Seg-5	11
3	pLAD	Seg-6	10
4	mLAD	Seg-7	6
5	pLCX	Seg-11	7
6	PL	Seg-16	1



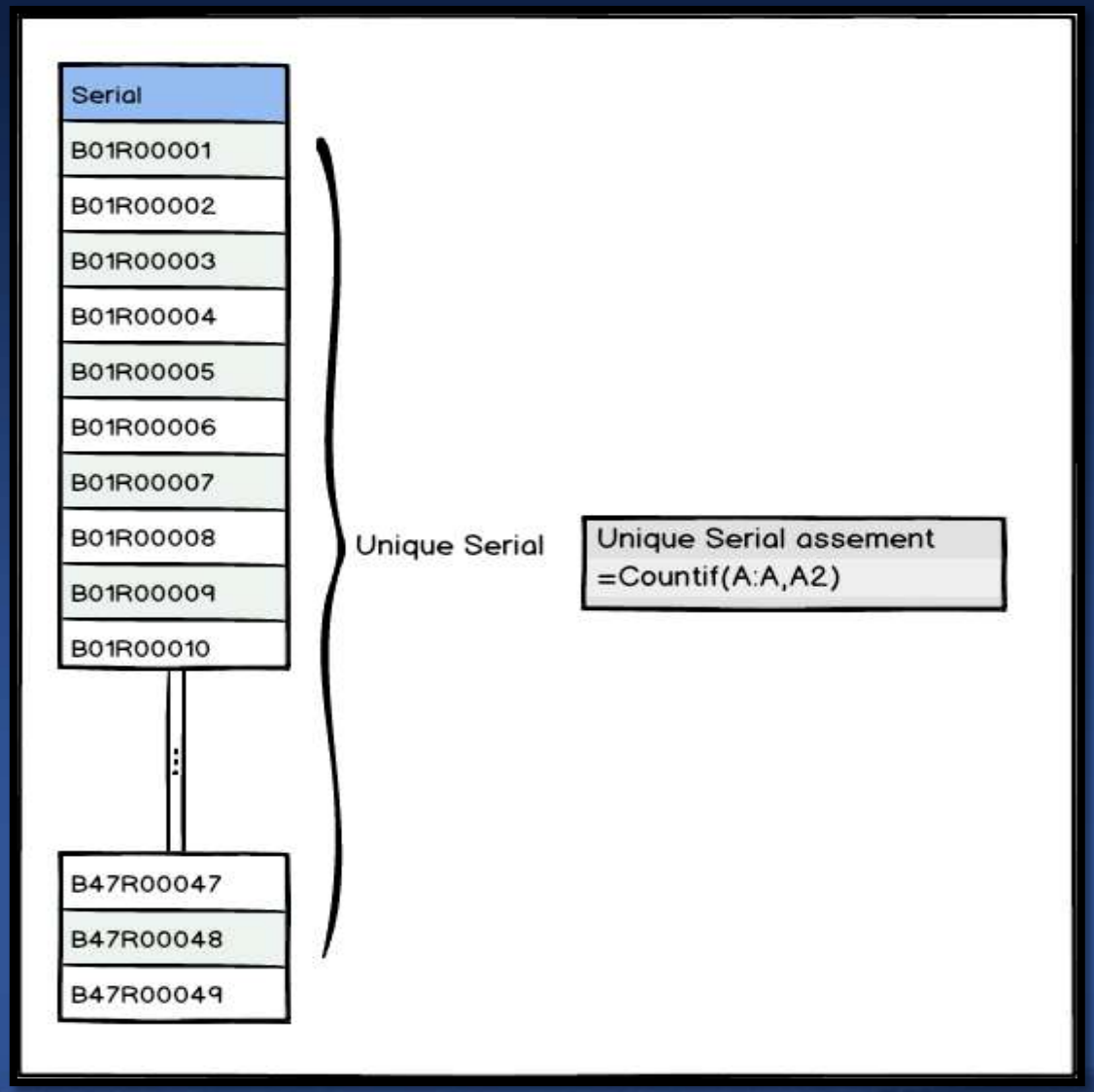
Lesion No	Seg	Seg No	Lesion Score
1	mRCA	Seg-2	3
2	pLAD	Seg-6	12
3	pLCX	Seg-11	5

Patient	Seg-1	Seg-2	Seg-3	Seg-4	Seg-5	Seg-6	Seg-7	Seg-8	Seg-9	Seg-10	Seg-11	Seg-12	Seg-12a	Seg-13	Seg-14	Seg-15	Seg-16
A001	5		3			8					2						
A002		4			11	10	6				7						1
A003		3				12					5						

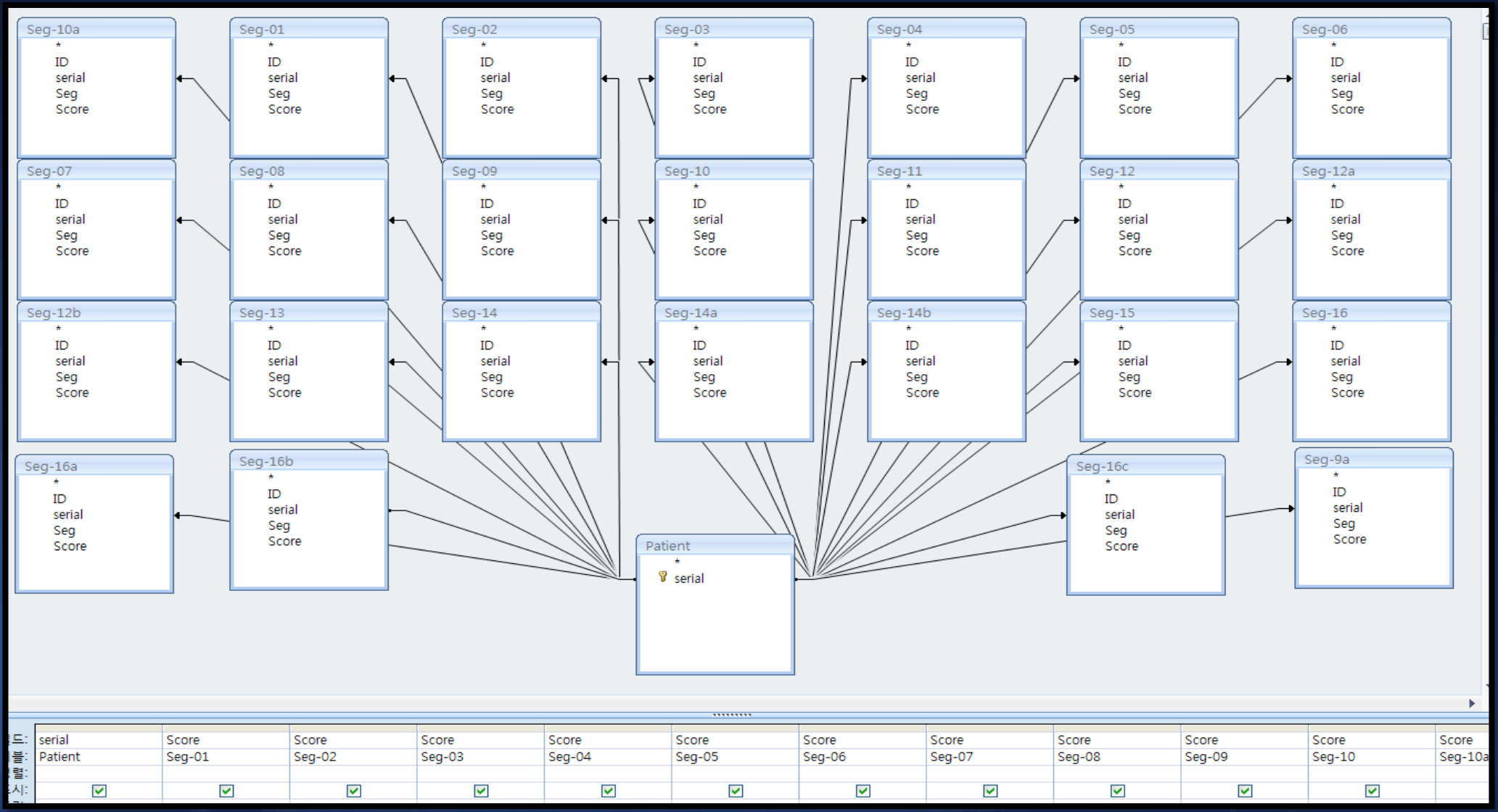
Segment Divide



Unique Serial



Join (Database Program : ACESS)



Syntax Score

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA
Serial	1	2	3	4	5	6	7	8	9	09a	10	10a	11	12	12a	12b	13	14	14a	14b	15	16	16a	16b	16c	Total
10748309		3	5		12		6		2				4				2									34
10767090	5	5			16	10	6																			42
11260136		2				8	6																			16
11939449					12	8							4													24
12094781			5	9	16		8																			38
12369416					13	8							3													24
12596845					12		13.5						6													31.5
12771057		4			11	7																				22
12802627					12		6										3									21
13166052		5			14	10																				29
13413347	4				15		5										4									28
13940957			3		14				2																	19
14086205					13																					13
15325686					10		12.5																			22.5
15427188		2			16									2												20
15691422		9			12		8						3													32
15750275					11	21.5																				32.5
15771986	2			3	12		9										2									28
15784595					14	22.5																				36.5
16261800	3	3			14																					20
16397730		3	6		17		8		3																	37
16441512						10											2									12
16656376					12				2								6.5									20.5

MySQL (Database Program)

Serial
ILM010002
ILM010010
ILM010011
ILM010012
ILM010014
ILM010016
ILM010018
ILM010019
ILM010020
ILM010021
ILM010022
ILM010024
ILM010025
ILM010026
ILM010028
ILM010030
ILM010033
ILM010038
ILM010040
ILM010041
ILM010042
ILM010043
ILM010048
ILM010049
ILM010051

Patient Serial

Serial	SEGMENT	Seg_Score
ILM010002	5	13
ILM010002	11	4
ILM010010	3	4
ILM010010	5	12
ILM010010	9	2
ILM010011	2	3
ILM010011	5	16
ILM010011	13	1
ILM010011	6	10
ILM010011	9	2
ILM010012	3	2
ILM010012	4	2
ILM010012	5	16
ILM010012	11	5
ILM010012	6	10
ILM010012	9	2
ILM010014	7	16.5
ILM010014	13	1
ILM010016	5	13
ILM010016	6	8
ILM010016	7	19.5
ILM010018	5	13
ILM010018	6	8
ILM010019	5	12

Lesion Score

SQL (Structure Query Language)

```
SELECT
  `A`.`Serial` AS `Serial`,
  `SEG01`.`Seg_Score` AS `01_Score`,
  `SEG02`.`Seg_Score` AS `02_Score`,
  `SEG03`.`Seg_Score` AS `03_Score`,
  `SEG04`.`Seg_Score` AS `04_Score`,
  `SEG05`.`Seg_Score` AS `05_Score`,
  `SEG06`.`Seg_Score` AS `06_Score`,
  `SEG07`.`Seg_Score` AS `07_Score`,
  `SEG08`.`Seg_Score` AS `08_Score`,
  `SEG09`.`Seg_Score` AS `09_Score`,
  `SEG09a`.`Seg_Score` AS `09a_Score`,
  `SEG10`.`Seg_Score` AS `10_Score`,
  `SEG10a`.`Seg_Score` AS `10a_Score`,
  `SEG11`.`Seg_Score` AS `11_Score`,
  `SEG12`.`Seg_Score` AS `12_Score`,
  `SEG12a`.`Seg_Score` AS `12a_Score`,
  `SEG12b`.`Seg_Score` AS `12b_Score`,
  `SEG13`.`Seg_Score` AS `13_Score`,
  `SEG14`.`Seg_Score` AS `14_Score`,
  `SEG14a`.`Seg_Score` AS `14a_Score`,
  `SEG14b`.`Seg_Score` AS `14b_Score`,
  `SEG15`.`Seg_Score` AS `15_Score`,
  `SEG16`.`Seg_Score` AS `16_Score`,
  `SEG16a`.`Seg_Score` AS `16a_Score`,
  `SEG16b`.`Seg_Score` AS `16b_Score`,
  `SEG16c`.`Seg_Score` AS `16c_Score`
FROM (`Patient` `A` left join `LesionScore` `SEG01` on(`A`.`Serial` = `SEG01`.`Serial`) and (`SEG01`.`SEGMENT` = '
1'))
left join `LesionScore` `SEG02` on(`A`.`Serial` = `SEG02`.`Serial`) and (`SEG02`.`SEGMENT` = '2')
left join `LesionScore` `SEG03` on(`A`.`Serial` = `SEG03`.`Serial`) and (`SEG03`.`SEGMENT` = '3')
left join `LesionScore` `SEG04` on(`A`.`Serial` = `SEG04`.`Serial`) and (`SEG04`.`SEGMENT` = '4')
left join `LesionScore` `SEG05` on(`A`.`Serial` = `SEG05`.`Serial`) and (`SEG05`.`SEGMENT` = '5')
left join `LesionScore` `SEG06` on(`A`.`Serial` = `SEG06`.`Serial`) and (`SEG06`.`SEGMENT` = '6')
left join `LesionScore` `SEG07` on(`A`.`Serial` = `SEG07`.`Serial`) and (`SEG07`.`SEGMENT` = '7')
left join `LesionScore` `SEG08` on(`A`.`Serial` = `SEG08`.`Serial`) and (`SEG08`.`SEGMENT` = '8')
left join `LesionScore` `SEG09` on(`A`.`Serial` = `SEG09`.`Serial`) and (`SEG09`.`SEGMENT` = '9')
left join `LesionScore` `SEG09a` on(`A`.`Serial` = `SEG09a`.`Serial`) and (`SEG09a`.`SEGMENT` = '9a')
left join `LesionScore` `SEG10` on(`A`.`Serial` = `SEG10`.`Serial`) and (`SEG10`.`SEGMENT` = '10')
left join `LesionScore` `SEG10a` on(`A`.`Serial` = `SEG10a`.`Serial`) and (`SEG10a`.`SEGMENT` = '10a')
left join `LesionScore` `SEG11` on(`A`.`Serial` = `SEG11`.`Serial`) and (`SEG11`.`SEGMENT` = '11')
left join `LesionScore` `SEG12` on(`A`.`Serial` = `□SEG12`.`Serial`) and (`SEG12`.`SEGMENT` = '12')
left join `LesionScore` `SEG12a` on(`A`.`Serial` = `SEG12a`.`Serial`) and (`SEG12a`.`SEGMENT` = '12a')
left join `LesionScore` `SEG12b` on(`A`.`Serial` = `SEG12b`.`Serial`) and (`SEG12b`.`SEGMENT` = '12b')
left join `LesionScore` `SEG13` on(`A`.`Serial` = `SEG13`.`Serial`) and (`SEG13`.`SEGMENT` = '13')
left join `LesionScore` `SEG14` on(`A`.`Serial` = `SEG14`.`Serial`) and (`SEG14`.`SEGMENT` = '14')
left join `LesionScore` `SEG14a` on(`A`.`Serial` = `SEG14a`.`Serial`) and (`SEG14a`.`SEGMENT` = '14a')
left join `LesionScore` `SEG14b` on(`A`.`Serial` = `SEG14b`.`Serial`) and (`SEG14b`.`SEGMENT` = '14b')
left join `LesionScore` `SEG15` on(`A`.`Serial` = `SEG15`.`Serial`) and (`SEG15`.`SEGMENT` = '15')
left join `LesionScore` `SEG16` on(`A`.`Serial` = `SEG16`.`Serial`) and (`SEG16`.`SEGMENT` = '16')
left join `LesionScore` `SEG16a` on(`A`.`Serial` = `SEG16a`.`Serial`) and (`SEG16a`.`SEGMENT` = '16a')
left join `LesionScore` `SEG16b` on(`A`.`Serial` = `SEG16b`.`Serial`) and (`SEG16b`.`SEGMENT` = '16b')
left join `LesionScore` `SEG16c` on(`A`.`Serial` = `SEG16c`.`Serial`) and (`SEG16c`.`SEGMENT` = '16c'))
order by `A`.`Serial`;
```

Syntax Score

Serial	01_Score	02_Score	03_Score	04_Score	05_Score	06_Score	07_Score	08_Score	09_Score	09a_Score	10_Score	10a_Score	11_Score	12_Score	12a_Score	12b_Score	13_Score	14_Score	14a_Score	14b_Score	15_Score	16_Score	16a_Score	16b_Score	16c_Score
ILM010002	NULL	NULL	NULL	NULL	13	NULL	NULL	NULL	NULL	NULL	NULL	NULL	4	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL
ILM010010	NULL	NULL	4	NULL	12	NULL	NULL	NULL	2	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL
ILM010011	NULL	3	NULL	NULL	16	10	NULL	NULL	2	NULL	NULL	NULL	NULL	NULL	NULL	NULL	1	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL
ILM010012	NULL	NULL	2	2	16	10	NULL	NULL	2	NULL	NULL	NULL	5	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL
ILM010014	NULL	NULL	NULL	NULL	NULL	NULL	16.5	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	1	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL
ILM010016	NULL	NULL	NULL	NULL	13	8	15.5	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL
ILM010018	NULL	NULL	NULL	NULL	13	8	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL
ILM010019	NULL	NULL	NULL	NULL	12	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL
ILM010020	NULL	NULL	NULL	NULL	14	13	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL
ILM010021	NULL	3	NULL	NULL	12	10	6	NULL	NULL	NULL	NULL	NULL	11.5	2	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL
ILM010022	NULL	11	NULL	NULL	15	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL
ILM010024	NULL	NULL	NULL	NULL	10	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL
ILM010025	NULL	6	NULL	NULL	11	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	1	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL
ILM010026	NULL	3	NULL	NULL	12	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL
ILM010028	NULL	NULL	NULL	NULL	12	NULL	6	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL
ILM010030	NULL	NULL	NULL	NULL	13	11	NULL	NULL	3	NULL	NULL	NULL	7	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL
ILM010033	5	5	NULL	NULL	20	12	NULL	NULL	NULL	NULL	NULL	NULL	4	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL
ILM010038	NULL	NULL	NULL	NULL	14	8	6	NULL	NULL	NULL	NULL	NULL	5	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL
ILM010040	NULL	NULL	NULL	NULL	10	NULL	15.5	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL
ILM010041	NULL	NULL	NULL	NULL	12	NULL	6	NULL	2	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL
ILM010042	NULL	NULL	NULL	NULL	12	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL
ILM010043	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL
ILM010048	NULL	NULL	NULL	NULL	11	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	2	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL
ILM010049	NULL	NULL	NULL	NULL	12	9	9	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL
ILM010051	NULL	NULL	NULL	NULL	12	11	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL
ILM010053	3	NULL	3	NULL	11	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

Conlcusion

- Spread sheet(Excel)을 통해 Syntax Score Data를 쉽게 입력
- Excel을 통해 입력을 할 경우 Data Validation (유효성 검사)기능으로 입력오류 예방
- Excel의 함수(Function)로 Segment weighting factors, Segment Score를 구할 수 있음
- Syntax Score(per patient)를 계산하기 위해 ACESS, MySQL을 이용하면 효율적임