

**ZIRCONIA –  
WHAT YOU NEED TO KNOW**

## ZIRCONIA 2020

### Critical Facts Clinicians Need When Helping Patients Make Choices

<u>Definition of Terms</u>	<u>Mol % Yttria Content</u> *	<u>Weight % Yttria Content</u> *	<u>% Tetragonal Phase Present</u>	<u>% Cubic Phase Present</u>	Source Company's Claimed Strengths●		Some Example Brand Names & Company Source
					Flexural Strength	Fracture Toughness	
<b>3Y zirconia</b>	Contains 3 mol % yttria*	Contains 4.5—6.0% yttria*	100% tetragonal phase present	0% cubic phase present	≥1,100 MPa (Megapascals)	≥5.0 MPa√m (K1C)	<ul style="list-style-type: none"> <li>• BruxZir Original 2009 (Glidewell)</li> <li>• BruxZir HT (Glidewell)</li> <li>• ZirCAD LT (Ivoclar)</li> <li>• ZirCAD Prime Core (Ivoclar)</li> <li>• ZirLux 16+ (Zahn Dental)</li> </ul>
<b>4Y zirconia</b>	Contains ≥4 mol % yttria*	Contains 6.0—8.0% yttria*	~ 75% tetragonal phase present	~ 25% cubic phase present	≥800 MPa (Megapascals)	≥3.5 MPa√m (K1C)	<ul style="list-style-type: none"> <li>• 3M Chairside Zirconia (3M)</li> <li>• ArgenZ HT+ (Argen)</li> <li>• Lava Esthetic (3M)</li> <li>• ZirCAD MT (Ivoclar)</li> </ul>
<b>5Y zirconia</b>	Contains ≥5 mol % yttria*	Contains 9.05—10.0% yttria*	~ 50% tetragonal phase present	~ 50% cubic phase present	≥650 MPa (Megapascals)	≥2.1 MPa√m (K1C)	<ul style="list-style-type: none"> <li>• BruxZir Anterior (Glidewell)</li> <li>• BruxZir Esthetic (Glidewell)</li> <li>• CubeX<sup>2</sup> (Dental Direkt)</li> <li>• Katana Block (Kuraray Noritake)</li> <li>• Katana STML (Kuraray Noritake)</li> <li>• ZirCAD Prime Incisal (Ivoclar)</li> </ul>

\* **Yttria** = a rare earth element commonly added originally to zirconium oxide to stabilize the molecular structure in its strongest tetragonal configuration; the same rare earth recently increased to change refractive index & give zirconia more translucence, but results in significant strength reductions (See above).

● **Claimed Strengths** = Use of different test methods & manipulation techniques cause important variations in strength numbers produced by laboratory tests in various test facilities. Clinical performance over time in a wide variety of situations is the only truly reliable test of durability.

**Definition of symbols** = ≥ means “greater than or equal to”; ≤ means “less than or equal to”.

# Esthetic Monolithic Crown Materials in TRAC Research Long-Term Clinical Study – 2020

KEY:  Zirconia Ceramic  Glass Ceramic  Polymer Containing  Zr Substructure + Veneer Ceramic

	Brand (Alphabetical by Company)	Source Company	Source Company's Claimed Values in 2019		
			Flexural Strength (MPa)	Fracture Toughness (MPa√m)	Zirconia Mol% yttria
1.	3M Chairside Zr	3M	1000	>6.4	4Y
2.	Alien HT	Alien Milling	1200	?	3Y
3.	Alien Multi-Layer	Alien Milling	1100	?	3Y
4.	ArgenZ HT+	Argen	1250	3.5	4Y
5.	BruxZir Anterior	Glidewell	650	2.1	5.5Y
6.	BruxZir Esthetic	Glidewell	870	2.7–3.1	4.7–4.9Y
7.	BruxZir NOW	Glidewell	800	5.0	3Y
8.	BruxZir Shaded	Glidewell	1100+	5.0	3Y
9.	cubeX <sup>2</sup>	Dental Direkt	720	4.8	5Y
10.	Katana Block	Kuraray Noritake	----	----	5–5.5Y
11.	Katana STML	Kuraray Noritake	748	3.2	5–5.5Y
12.	Lava Esthetic	3M	800	>4.0	4Y
13.	Pavati Z40.1	CCRI / Sirona	1100	5.0	3Y
14.	ZirCAD LT	Ivoclar Vivadent	1243	5.1	3Y
15.	ZirCAD MT	Ivoclar Vivadent	850	3.6	4Y
16.	ZirCAD Prime (contains 2 Zr formulations)	Ivoclar Vivadent	1200 = 3Y (core) ? = 5Y (incisal)	5.1 = core ? = incisal	3Y core 5Y incisal
17.	Zirlux 16+	Zahn	1200+	5.0+	3Y

KEY:  Zirconia Ceramic   
 Glass Ceramic   
 Polymer Containing   
 Zr Substructure + Veneer Ceramic

			Source Company's Claimed Values in 2019		
	Brand (Alphabetical by Company)	Source Company	Flexural Strength (MPa)	Fracture Toughness (MPa√m)	Material Category
18.	Celtra DUO	Dentsply	210 polished only 370 with firing	?	Glass ceramic 10% Zr & lithium silicate
19.	e.maxCAD	Ivoclar Vivadent	>400	2.25—2.5	Glass ceramic Lithium disilicate
20.	Camouflage NOW	Glidewell	192.62	?	Polymer containing
21.	CeraSmart	GC America	270	?	Polymer containing
22.	Enamic	Vita	150-160	1.5	<i>Unique</i> Polymer containing (86% ceramic scaffold)
23.	Lava Ultimate	3M	200	2.0	Polymer containing
24.	PressCeram veneer ceramic over Metoxit 3Y Zirconia	Swiss NF – Canada	≥1,000=substructure ≤100=veneer ceramic	≥5.0=substructure ≤1.0=veneer ceramic	Veneer ceramic over Zr substructure

**NEW “HOT TOPIC” –  
THERAPEUTIC  
RESTORATIVE MATERIALS**

## 2020 Therapeutic Materials that Remain in the Oral Cavity Indefinitely in TRAC Research Study

TRAC's Material Category	Brand	Company	Product Description	Time in TRAC Studies
<b>Antibacterial</b>	• Infinix	Nobio	Antimicrobial resin-based composite for universal use.	Starts Spring 2020
<b>Buffer Capacity</b>	-----	-----	-----	-----
<b>Calcium &amp; Phosphate Ion Releasing</b>	• Activa	Pulpdent	Claims to release fluoride, calcium, & phosphate ions to stimulate apatite formation & remineralization at the material-tooth interface. <i>(TRAC Research could not confirm these claims <i>in vivo</i> or <i>in vitro</i>.)</i>	3.5 years
	• Predicta Bulk (HV & LV viscosities)	Parkell	Claims to release fluoride, calcium, & phosphate ions to stimulate apatite formation & remineralization at the material-tooth interface. <i>(TRAC Research working on validation now.)</i>	Less than 1 year
<b>High Fluoride Ion Releasing</b>	• Equia Forte Fil	GC	<u>Conventional glass ionomer</u> releases fluoride ion in high amounts and over long period of time (years) & seals at material-tooth interface for at least 3 years. <i>(TRAC Research has validated above both <i>in vivo</i> and <i>in vitro</i>.)</i>	3.5 years
	• Equia Forte HT Fil	GC	Same as Equia Forte above, but translucency and strength improved. <i>(TRAC Research working on validation now.)</i>	Less than 1 year
	• Fuji Automix LC	GC	<u>Resin-modified glass ionomer</u> releases fluoride ion in high amounts and over long period of time (years), and does not require triturator for mixing. <i>(TRAC Research working on validation now.)</i>	Less than 1 year
	• Ketac Universal	3M	<u>Conventional glass ionomer</u> using nanotechnology releases fluoride ion in high amounts and over long period of time (years) & seals at material-tooth interface for at least 3 years. <i>(TRAC Research has validated above both <i>in vivo</i> and <i>in vitro</i>.)</i>	3.5 years
	• Smart Advantage	Elevate	<u>Conventional glass ionomer</u> with opaquing added to minimize dark stain of silver diamine fluoride (SDF) when it is applied first to "arrest" caries. Releases fluoride ion. <i>(TRAC Research working on validation now.)</i>	Less than 1 year

**DENTAL CARIES**  
**NEW INSIGHTS**

# Are you at risk for **type 2 diabetes?**

1. **How old are you?** .....

Less than 40 years (0 points)  
 40-49 years (1 point)  
 50-59 years (2 points)  
 60 years or older (3 points)

2. **Are you a man or a woman?** .....

Man (1 point)      Woman (0 points)

3. **Do you have a mother, father, sister or brother with diabetes?**.....

Yes (1 point)    No (0 points)

4. **Do you have high blood pressure or are you on medication for high blood pressure? ....**

Yes (1 point)    No (0 points)

5. **Are you physically active?**.....

Yes (0 points)    No (1 point)

6. **Are you overweight? *See chart on reverse side***.....

Not overweight or obese (0 points)      Overweight (1 point)  
 Obese (2 points)                              Extremely obese (3 points)

**ADD UP YOUR SCORE**

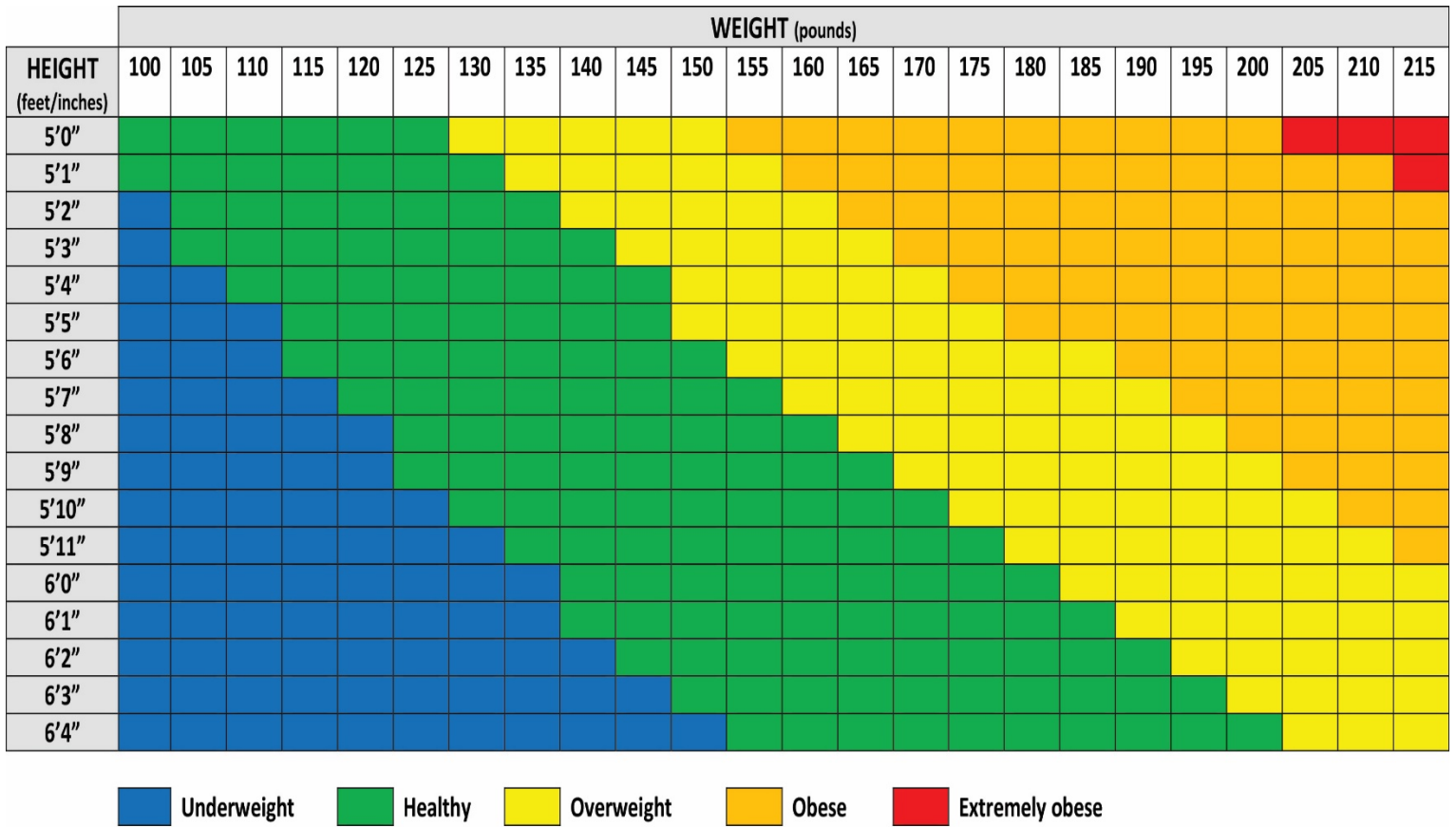
## **If you scored 5 or higher:**

You are at increased risk for type 2 diabetes. However, only your doctor can tell for sure if you do have type 2 diabetes or prediabetes. Talk to your doctor.

Type 2 diabetes is more common in African Americans, Hispanics/Latinos, Native Americans, Native Hawaiians, Pacific Islanders, and Asian Americans. Although higher body weight increases diabetes risk for everyone, Asian Americans are at increased risk at lower body weight than the rest of the general public (about 15 pounds lower).

Adapted from Bang et al, Ann Intern Med 151:775-783, 2009  
 Original algorithm was validated without gestational diabetes as part of the model.





**Obesity definitions using Body Size defined by waist measurements:**

**Overweight** .....If waist 37 inches or more for Male; 31.5 inches or more for Female.

**Obese** ..... If waist 40 inches or more for Male; 35 inches or more for Female.

**Extremely obese**.....If waist 50 inches or more for Male; 49 inches or more for Female.

Adapted from Bang et al, Ann Intern Med 151:775-783, 2009  
 Original algorithm was validated without gestational diabetes as part of the model.