

### Test of Mastication and Swallowing Solids (TOMASS)

Huckabee, M.L., et al. (2018). The Test of Masticating and Swallowing Solids (TOMASS): Reliability, validity and international normative data. *Int J Lang Commun Disord*, 53(1), 144-156. doi: 10.1111/1460-6984.12332. PMID: 28677236.

**Set-up:** (person is alert and already deemed safe to be further tested/challenged with a dry cracker)

- **Saltine Crackers** (if you do not have a typical Saltine, then try with Carr's Table Water Crackers - available in the US, UK & Ireland. Graham crackers are NOT applicable to data below)
- Liquid in a cup (thin or thickened, per individual's needs & precautions)
- Clock App on phone. Use **Stopwatch** with **Start** and **Lap** buttons (Tap Lap for each chew cycle).
- Clinician observes diagonally from the side, with ability to see under the chin & palpate swallows

**Instructions:**

1. Sit up comfortably & safely. Use dentures if person typically eats with them in place.
2. Check mouth. Start with a small sip of liquid if mouth is dry & if this is required for safety.
3. Give 1 cracker, saying: **"Eat this as quickly as is comfortably possible, AND when you have finished, say your name out loud."**
4. Take a sip of water after finishing the 1st trial. If safe, give a 2nd cracker of same type.
5. Use the data from the **1st trial only**. See the white, left-sided section of charts below.
6. Observe & comment on second trial differences.

**Data:** Cracker (circle): Saltine / Carr's Table Water Cracker

Gender: Female / Male / Non-binary

Age: 20-40 / 40-60 / 60-80 / 80+

Data Points	Trial 1	Trial 2	Comments (dentition, dry mouth, impulsivity, etc)
Number discrete bites to finish 1 cracker			
Number of <i>masticatory cycles</i> * (count each chew cycle by clicking "Lap")			
Number of swallows per whole cracker			
Total time to complete the whole cracker (when cracker passes bottom lip to name out loud)			

\*A masticatory cycle is each up/down or rotary movement, which correlates with sEMG signals for maximum masseter muscle activity (closing jaw) alternating with maximal submental activity (opening). Do not count lingual sweeping to collect the bolus nor any tongue movements prior to the swallow.

**Normative data** from pages 150-151 in Huckabee, M.L., et al. (2018). Pages 150, 152, 153 have other crackers on the global market.

**SALTINE**

Table 4. TOMASS normative data consisting of mean and 95% confidence intervals by age and gender for the Nabisco Saltine™ cracker

		TEST OF MASTICATING AND SWALLOWING SOLIDS: Nabisco Saltine™ cracker																	
Sex	Age	Discrete bites per cracker		Masticatory cycles per cracker		Swallows per cracker		Total time (in sec)		Masticatory cycles per bite		Swallows per bite		Time per bite (in sec)		Time per masticatory cycle (in sec)		Time per swallow (in sec)	
		Mean	95% CI	Mean	95% CI	Mean	95% CI	Mean	95% CI	Mean	95% CI	Mean	95% CI	Mean	95% CI	Mean	95% CI	Mean	95% CI
Males	20-40	1.40	.90-1.90	30.80	25.25-36.35	1.70	.94-2.46	23.42	17.74-29.09	24.05	20.18-27.92	1.30	.62-1.98	18.15	13.36-22.74	.79	.64-.95	15.73	12.23-19.23
	40-60	1.40	1.03-1.77	34.30	23.18-45.42	2.20	1.26-3.14	28.04	15.46-40.62	26.20	16.16-36.24	1.65	.93-2.37	20.70	13.15-28.26	.81	.67-.96	13.22	11.25-15.19
	60-80	2.10	1.69-2.51	41.50	33.94-49.07	2.40	1.90-2.90	30.66	25.22-36.09	21.77	13.18-30.36	1.20	.90-1.50	16.35	9.29-23.41	.75	.67-.83	13.70	10.43-16.98
	80+	3.70	3.11-4.29	54.30	41.68-66.92	3.40	2.50-4.30	44.29	35.62-52.96	14.65	11.94-17.35	.91	.71-1.12	12.08	9.89-14.28	.83	.76-.90	14.17	11.20-17.14
Females	20-40	2.10	1.47-2.72	40.30	30.80-49.80	2.30	1.71-2.89	26.40	21.44-31.35	20.70	16.73-24.67	1.20	.85-1.55	14.83	9.46-20.20	.68	.56-.81	12.25	9.79-14.72
	40-60	3.20	2.46-3.94	53.40	41.66-65.14	2.50	1.80-3.20	36.41	29.21-43.62	17.37	13.49-21.24	.81	.59-1.04	11.80	9.63-13.97	.69	.63-.76	16.36	11.73-20.99
	60-80	2.80	2.50-3.10	39.50	32.75-46.26	2.90	2.49-3.31	37.71	31.52-43.90	13.28	11.97-16.60	1.03	.96-1.11	13.58	11.38-15.78	.97	.83-1.11	13.24	10.92-15.56
	80+	4.00	3.42-4.58	63.60	50.39-76.21	4.00	3.42-4.58	59.50	51.20-67.80	16.08	12.98-19.17	1.00	1.00-1.00	15.23	12.95-17.51	.99	.78-1.21	15.23	12.95-17.51

**CARR'S**

Table 5. TOMASS normative data consisting of mean and 95% confidence intervals by age and gender for Carr's Table Water™ Cracker

		TEST OF MASTICATING AND SWALLOWING SOLIDS: Carr's Water™ Cracker																	
Sex	Age	Discrete bites per cracker		Masticatory cycles per cracker		Swallows per cracker		Total time (in sec)		Masticatory cycles per bite		Swallows per bite		Time per bite (in sec)		Time per masticatory cycle (in sec)		Time per swallow (in sec)	
		Mean	95% CI	Mean	95% CI	Mean	95% CI	Mean	95% CI	Mean	95% CI	Mean	95% CI	Mean	95% CI	Mean	95% CI	Mean	95% CI
Males	20-40	1.80	1.24-2.36	30.80	21.38-40.22	1.90	1.27-2.53	24.04	17.54-30.54	19.47	12.53-26.40	1.05	.94-1.16	14.39	11.07-17.70	.81	.64-.98	13.83	10.50-17.16
	40-60	2.17	1.27-3.06	35.75	28.12-43.38	1.83	1.24-2.43	28.58	23.29-33.87	21.45	14.24-28.67	.93	.81-1.04	18.21	11.07-25.35	.84	.70-.98	19.13	12.51-25.73
	60-80	2.14	1.56-2.74	47.20	28.54-65.86	2.30	1.23-3.37	39.69	25.61-53.77	21.08	14.72-27.43	.96	.79-1.13	18.09	12.75-23.43	.87	.75-1.0	19.24	14.13-24.35
	80+	2.38	1.94-2.81	66.25	50.97-81.53	2.75	1.88-3.62	55.02	42.63-67.42	29.04	19.97-38.11	1.21	.76-1.65	23.69	17.46-29.93	.83	.73-.94	29.55	16.27-36.84
Females	20-40	2.92	2.49-3.34	42.83	35.89-49.78	3.17	2.80-3.53	34.17	29.78-38.55	15.39	12.23-18.56	1.11	.98-1.24	12.23	9.99-14.45	.84	.68-.99	11.12	9.24-13.00
	40-60	3.45	2.64-4.27	42.55	35.65-49.44	2.91	2.15-3.67	38.97	34.06-43.88	13.15	10.83-15.47	.86	.67-1.05	12.42	9.27-15.56	.94	.80-1.08	15.12	11.46-18.79
	60-80	3.67	2.45-4.88	52.78	38.08-67.47	3.22	2.08-4.36	54.23	37.08-71.38	16.73	9.81-23.64	.98	.62-1.34	17.15	10.04-24.25	1.06	.82-1.29	19.00	12.71-25.29
	80+	3.78	3.14-4.42	59.22	48.21-70.23	3.44	2.49-4.39	50.81	39.56-62.06	16.13	13.22-19.03	.89	.72-1.06	13.75	10.98-16.51	.85	.77-.93	16.44	11.61-21.26