

Cerebrovascular response to bariatric surgery

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Abstract

Background: Obesity is associated with decreased cerebrovascular reactivity (CVR), an estimate of the brain's blood flow self-regulation and cerebrovascular health. **Objective:** To compare the CVR in 2011 and 2015 through transcranial Doppler (TCD) assessment in subjects with obesity, according with weight trajectories (weight gain [WG] $\geq 10\%$, weight loss [WL] $\geq 10\%$, and weight stable [WS] $< 5\%$) and type of treatment (bariatric surgery or medical treatment). **Methods:** TCD assessment in 2015 on subjects with obesity who underwent cerebrovascular evaluation in 2011 and who attend an Obesity Clinic. **Clinical parameters included:** Weight, body mass index (BMI), % body fat, fasting and 2-hour glucose and insulin during a 2 hour glucose tolerance test, HbA1c, blood lipids, and cerebrovascular indexes 1) Pulsatility Index (PI), Resistance Index (RI), and 2) CVR (through the Breath Holding Index [BHI]). Changes were compared between weight trajectories and type of treatment. **Results:** We included 34 subjects (12% men, mean age 38.9 ± 7 years, mean BMI 41.3 ± 7 kg/m²). Despite improved BMI, body fat, insulin sensitivity, HbA1c, and total cholesterol ($p < 0.05$), subjects with bariatric surgery and those with WL $\geq 10\%$, had decrease in CVR (0.90 ± 0.42 to 0.84 ± 0.39 , and 0.91 ± 0.40 to 0.84 ± 0.37) compared to WS subjects, (0.82 ± 0.34 to 0.83 ± 0.84). In WS subjects, PI and RI decreased significantly (0.87 ± 0.11 to 0.75 ± 0.11 , and 0.55 ± 0.05 to 0.50 ± 0.05) in comparison with non-significant increase in the group with 10% WG (0.85 ± 0.10 to 0.87 ± 0.06 , and 0.54 ± 0.04 to 0.55 ± 0.02 , respectively). HbA1c and LDL-cholesterol were significantly correlated with PI and RI, but not after adjusting for BMI change. **Conclusions:** In patients with severe obesity without cardiovascular disease, significant weight changes were associated with reduced CVR and a tendency for increased PI and RI, in comparison with subjects who remained weight stable after 4 years of treatment. This shows relevant hemodynamic effect of weight changes on neurologic outcomes in people with obesity.

Image

	WL5% (n=16)	WL 10% (n=11)	BS n=10	WG5% (n=9)	WG10% (n=3)	WS (n=9)
RM	↓	↓↓	↓↓	↓ NS	↓ NS	↓ NS
V	↓ NS	↓ NS	↓ NS	↓ NS	↑ NS	↓↓↓
RPI	↓ NS	↓ NS	↓ NS	↓ NS	↑ NS	↓↓↓
RRI	↓ NS	↓ NS	↓ NS	↓ NS	↓	↑ NS
RBH	↓	↓	↓	↓ NS	↓ NS	↓ NS
I	↓ NS	↓ NS	↓ NS	↓ NS	↓ NS	↓ NS
LMV	↓ NS	↓ NS	↓ NS	↓ NS	↓ NS	↓ NS
LPI	↓	↓	↓	↓ NS	↓ NS	↑ NS
LRI	↓	↓	↓	↓ NS	↓ NS	↑ NS
LBHI	↓	↓	↓	↓ NS	↓ NS	↑ NS

Recent publications

1. Rexrode KM, Hennekens CH, Willett WC, et al. A prospective study of body mass index, weight change, and risk of stroke in women. *Jama*. May 21 1997;277(19):1539-1545.
2. Sheffler LR, Knutson JS, Gunzler D, Chae J. Relationship between body mass index and rehabilitation outcomes in chronic stroke. *American journal of physical medicine & rehabilitation / Association of Academic Physiatrists*. Nov 2012;91(11):951-956.
3. Johnson BL, Blackhurst DW, Latham BB, et al. Bariatric surgery is associated with a reduction in major macrovascular and microvascular complications in moderately to severely obese patients with type 2 diabetes mellitus. *Journal of the American College of Surgeons*. Apr 2013;216(4):545-556; discussion 556-548.
4. Lavi S, Gaitini D, Milloul V, Jacob G. Impaired cerebral CO₂ vasoreactivity: association with endothelial dysfunction. *American journal of physiology. Heart and circulatory physiology*. Oct 2006;291(4):H1856-1861.
5. Rodríguez-Flores M, García-García E, Cano-Nigenda CV, Cantu-Brito C. Relationship of obesity and insulin resistance with the cerebrovascular reactivity: a case control study. *Cardiovascular diabetology*. 2014;13:2.
6. Tesaro M, Schinzari F, Adamo A, Rovella V, Martini F, Mores N, et al. Effects of GLP-1 on forearm vasodilator function and glucose disposal during hyperinsulinemia in the metabolic syndrome. *Diabetes Care*. 2013;36(3):683-9.

Biography

Marcela Rodríguez Flores Undertook a high specialty posgraduate course in Obesity at the Instituto Nacional de Ciencias Médicas y Nutrición Salvador Zubirán and participated in the development of a national primary care program for obesity for ISSSTE in Mexico. Her Masters project in Medical Science focused on the study of cerebrovascular reactivity in subjects with obesity. She is currently developing research on the cardiovascular effects of bariatric surgery and currently is under a clinical fellowship at Laval University, Québec, Canada to assess effects of gastric bypass, biliopancreatic diversion, and sleeve gastrectomy versus medical treatment. Other areas of research are psychosocial promoters of obesity, glucose variability after gastric bypass, effects of exercise on the adipose tissue production of irisin, effect of surgery on microbiota and comorbidities, and disorders in body composition related with eating disorders.

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