As weight-loss surgery is an effective treatment for the glycaemic control of type 2 diabetes in obese patients, yet not all patients benefit, it is valuable to find predictive factors for this diabetic remission. This will help elucidating possible mechanistic insights and form the basis for prioritising obese patients with dysregulated diabetes for surgery where diabetes remission is of interest. In this study, we combine both clinical and genomic factors using heuristic methods, informed by prior biological knowledge in order to rank factors that would have a role in predicting diabetes remission, and indeed in identifying patients who may have low likelihood in responding to bariatric surgery for improved glycaemic control. Genetic variants from the Illumina CardioMetaboChip were prioritised through single-association tests and then seeded a larger selection from protein–protein interaction networks. Artificial neural networks allowing nonlinear correlations were trained to discriminate patients with and without surgery-induced diabetes remission, and the importance of each clinical and genetic parameter was evaluated. The approach highlighted insulin treatment, baseline HbA1c levels, use of insulin-sensitising agents and baseline serum insulin levels, as the most informative variables with a decent internal validation performance (74% accuracy, area under the curve (AUC) 0.81). Adding information for the eight top-ranked single nucleotide polymorphisms (SNPs) significantly boosted classification performance to 84% accuracy (AUC 0.92). The eight SNPs mapped to eight genes — ABCA1, ARHGEF12, CTNNBL1, GLI3, PROK2, RYBP, SMUG1 and STXBP5 — three of which are known to have a role in insulin secretion, insulin sensitivity or obesity, but have not been indicated for diabetes remission after bariatric surgery before.
ISI indexed (2013): ISI indexed yes
Scopus rating (2012): CiteScore 3.43 SJR 1.683 SNIP 1.067
Web of Science (2012): Impact factor 3.906
ISI indexed (2012): ISI indexed no
Scopus rating (2011): CiteScore 3.33 SJR 1.668 SNIP 0.934
ISI indexed (2011): ISI indexed no
Scopus rating (2010): SJR 1.72 SNIP 0.996
Original language: English
Keywords: Data processing, Molecular medicine, Risk factors, Systems biology
Electronic versions:
Ranking_factors_involved_in_diabetes_remission_after_bariatric_surgery_using_machine_learning_integrating_clinical_an
d_genomic_biomarkers.pdf
DOIs:
10.1038/npjgenmed.2016.35

Bibliographical note
This work is licensed under a Creative Commons Attribution 4.0 International License. The images or other third party material in this article are included in the article’s Creative Commons license, unless indicated otherwise in the credit line; if the material is not included under the Creative Commons license, users will need to obtain permission from the license holder to reproduce the material. To view a copy of this license, visit http://creativecommons.org/licenses/by/4.0/
Source: FindIt
Source-ID: 2347931096
Research output: Research - peer-review ; Journal article – Annual report year: 2016