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Novel anti diabetic phytochemicals: Isolation, protein target and mechanism of action

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Nature is the best cooker of medicines due to the fact that natural products have been optimized to interact optimally with the biological systems through a long natural selection process. Natural products therefore have been a source of therapeutics for millennia, and during the past century, many drugs have been developed from natural sources. We have evaluated the anti-diabetic activity of the aerial parts (except when indicated) of several medicinal plants extracts *in vitro* namely: *Abelmoschus esculentus* L. (AE), *Allium cepa* (bulb, AC), *Allium sativum* (bulb, AS), *Asparagus aphyllus* L. (AA), *Atriplex halimus* (AH), *Cinnamomon cassia* (CC), *Crataegus azarolus* L. (CA), *Gundelia tournefortii (GT), Nigella sativa* (seeds, NS), *Ocimum Basilicum* (OB), *Olea Europea* (leaves, OE), *Trigonella foenum-graecum* (TF), *Teucrium polium* (TP) and *Urtica dioica* (UD). Water/ethanol, methanol, hexane and dichloromethane extracts were prepared from the above listed plants and the extracts toxicity and efficacy was tested in L6 muscle cells. Cytotoxic and anti-diabetic properties of the extract were evaluated also *in vitro* using L6-GLUT4myc muscle cells stably expressing myc epitope at the exofacial loop (GLUT4). GLUT4 translocation to the plasma membrane (PM) was elevated by up to 4 and 7 folds (-/+ insulin) after treatment with AA, AH, CV, GT, OB, TF, TP and UD for 20 h at none cytotoxic concentrations as measured with MTT and the LDH leakage assay. Sweet basil (OB) extracts were the most efficient in augmenting GLUT4 translocation to the PM. GC/MS phytochemical analysis of GT, OB and TP methanol and hexane extracts revealed tens of compounds (some of them were detected for the first time by our group, Fig.1. These findings indicate that the observed anti diabetic properties of these plants are mediated, at least partially, through regulating GLUT4 translocation.

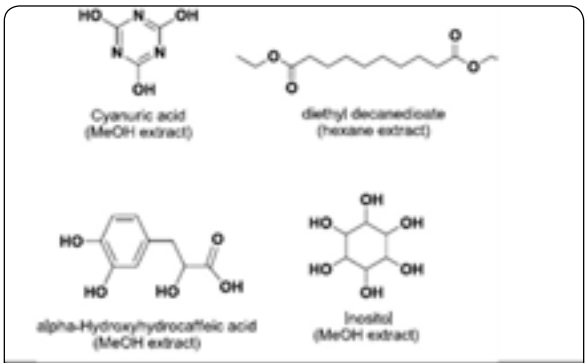

Fig.1 Some of the new detected phytochemicals in *O. basilicum*.

Recent Publications

1. Kadan S, Saad B, Sasson Y, Benvalid S H, Linn T, Cohen G and Zaid H (2018) Anti-diabetic activity and chemical composition of *Teucrium polium* L. Advancement in Medicinal Plant Research 6(1):1-8.
2. Shamni O, Cohen G, Gruzman A, Zaid H, Klip A, Cerasi E and Sasson S (2017) Regulation of GLUT4 activity by 3-O-methyl-D-glucose. Biochimica et Biophysica Acta Biomembranes 1859(10):1900-1910.
3. Kadan S, Saad B, Sasson Y and Zaid H (2016) *In vitro* evaluation of anti-diabetic activity and cytotoxicity of chemically analyzed *Ocimum basilicum* extracts. Food Chemistry Journal 196:1066-1074.
4. Daragmeh J, Barriah W, Saad B and Zaid H (2016) Analysis of PI3K pathway components in human cancers. Oncology Letters 11(4):2913-2918.
5. Zaid H, Raiyn J, Osman M, Falah M, Srouji S and Rayan A (2016) *In-silico* modeling techniques for predicting tertiary structure of human H4 receptor. Frontiers in Bioscience 21:597-619.

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Biography

Hilal Zaid is the Head of Alqasemi Educational Research Center, a former Head of the Sciences Teaching Department and a Senior Researcher in Biochemistry and Cell Biology at Al-Qasemi Academic College, Israel. He received his PhD in Biochemistry and Molecular Biology from the Ben-Gurion University, Israel on June 2005 and then was trained as a Postdoctoral Fellow at the Banting and Best Department of Medical Research, the University of Toronto. On 2006, he joined the Program in Cell Biology at the Hospital for Sick Children as a Postdoctoral Fellow until July 2008. He was recruited temporary at Ben-Gurion University as a Research Associate for 7 months. At the beginning of 2009 (until now), he established his own lab at Al-Qasemi Research Center, Al-Qasemi Academic College. He has over 85-refereed publications (35 journal articles, most of them in highly-rated journals; 1 book, 3 book chapters; 47 conference abstracts).

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