Austin Journal of Nutrition and Food Sciences

Open Access

Austin Publishing Group

Special Article - Food Supplements: Clinical Cases & Short Reports

Food Supplement Development in Russia on the Basis of Cell Culture Experiments

Jargin SV*

Department of Pathology, Peoples' Friendship University of Russia, Russia

***Corresponding author:** Jargin SV, Department of Pathology, Peoples' Friendship University of Russia, Clementovski per 6-82; 115184 Moscow, Russia

Received: August 25, 2015; **Accepted:** August 31, 2015; **Published:** September 04, 2015

Keywords

Atherosclerosis; Cell culture; Dietary supplements

Letter to the Editor

The large research series has become internationally known after the publications with participation of the former Soviet minister of health [1] and continues until today [2]. In brief, cultures of smooth muscle cells or monocytes/macrophages were used for evaluation of the ability of different substances to enhance or diminish cholesterol deposition in the cells, incubated with sera from atherosclerosis patients, which was interpreted as pro- or anti-atherogenic effects. Among others, the following was reported: during 24 hours of incubation with diluted sera from patients with coronary atherosclerosis, the contents of total intracellular cholesterol in the cultured cells increased 2- to 5-fold. The LDL from coronary atherosclerosis patients caused a 2- to 4-fold elevation of cholesterol level in the cultured cells. Incubation with sera or LDL from healthy subjects did not induce cholesterol accumulation by the cultures [3,4]. According to the personal communication from Dr. Aksenov at the 77th Congress of the European Atherosclerosis Society (2008) the "cultures" did not grow; therefore, it might be more appropriate to name these cells, surviving for about 7 days in serum-containing media [5], not "cell cultures" but "incubated cells". This model was used for evaluation of sex hormones: the estrogens and testosterone were reported to reduce intracellular cholesterol accumulation. Interestingly, dihydrotestosterone had the opposite effect [6]. After the latter remark had been published [7], an analogous communication reported that testosterone "increased intracellular cholesterol content" [5]. Using the same model, various drugs and natural substances were found to have pro- or anti-atherogenic effects [8]. However, as discussed previously [7,9,10], a relationship between the uptake of lipids by cells *in vitro* and hyperlipidemia *in vivo* can be inverse rather than direct. The lipoprotein receptors are expressed both on macrophages and smooth muscle cells. An up-regulation of lipoprotein receptors is one of the action mechanisms of certain lipid-lowering agents [11]. If an agent lowers the uptake of lipids by cells *in vitro*, it should be expected to elevate the blood cholesterol level *in vivo*. Admittedly, modifications of the chemical structure of LDL particles may facilitate LDL ingress into cells through non-receptor-regulated pathways [12]; but it would possibly lower blood cholesterol level i.e. act against atherogenesis *in vivo*. In any case, the use of cultures or incubated cells for prediction of body responses is limited [9,10]; and drug doses [13] should not be calculated on the basis of cell culture experiments only. Some results obtained *in vitro* or ex vivo by the same researchers, such as anti-atherogenic effects of mushroom extracts [14], canned fish [15], or pine needles [16], appear doubtful. Recommendations for practice [17], based on the cell culture experiments discussed above, appear to be unsubstantiated at least in part. This example shows how suboptimal methods are used for official registration of dietary supplements and obtaining permissions for their practical use. Research quality and possible influence by the industry [9] should be taken into account defining inclusion criteria for studies into meta-analyses and reviews.

Acknowledgement

The materials were presented at the Healthy Aging Meeting, sponsored by the Dubbo Study of Australian Elderly on March 30, 2012 in Sydney, Australia; and at the XXIX Congress of the International Academy of Pathology on September 30, 2012 in Cape Town, South Africa. The author is sincerely grateful to all colleagues who participated in discussion and improvement of this report.

References

1. Chazov EI, Tertov VV, Orekhov AN, Lyakishev AA, Perova NV, Kurdanov KA, et al. Atherogenicity of blood serum from patients with coronary heart disease. Lancet. 1986; 2: 595-598.
2. Orekhov AN. Direct anti-atherosclerotic therapy; development of natural anti-atherosclerotic drugs preventing cellular cholesterol retention. Curr Pharm Des. 2013; 19: 5909-5928.
3. Orekhov AN, Tertov VV, Pokrovsky SN, Adamova IYu, Martsenyuk ON, Lyakishev AA, et al. Blood serum atherogenicity associated with coronary atherosclerosis. Evidence for nonlipid factor providing atherogenicity of low-density lipoproteins and an approach to its elimination. Circ Res. 1988; 62: 421-429.
4. Tertov VV, Orekhov AN, Sobenin IA, Gabbasov ZA, Popov EG, Yaroslavov AA, et al. Three types of naturally occurring modified lipoproteins induce intracellular lipid accumulation due to lipoprotein aggregation. Circ Res. 1992; 71: 218-228.
5. Aksenov D, Orekhova D, Kireev R, Andrianova I., Smirnov A., Sobenin I, et al. Effects of sex hormones on intracellular cholesterol accumulation and LDL aggregation. Effect of sex hormones on intracellular cholesterol accumulation and LDL aggregation. Abstracts of the 77th Congress of the European Atherosclerosis Society, 26-29 April 2008, Istanbul. Atherosclerosis Supplements. 2008; 9: 20.
6. Kireev RA, Kuvshinova E, Andrianova IV, Sobenin IA, Orekhov AN. Effect of sex hormones on atherosclerotic indices in primary culture of female cells. Abstracts of the 14th International Symposium on Atherosclerosis, 18-22 June 2006, Rome. Atherosclerosis Supplements. 2006; 7: 250.
7. Jargin SV. Cell Culture as a Testing System for Anti-Atherogenic Substances: A Brief Communication. Acta Pharmaceutica Sciencia. 2008; 50: 237-240.
8. Sobenin IA, Chistiakov DA, Bobryshev YV, Orekhov AN. Blood atherogenicity as a target for anti-atherosclerotic therapy. Curr Pharm Des. 2013; 19: 5954-5962.

Citation: Jargin SV. Food Supplement Development in Russia on the Basis of Cell Culture Experiments. Austin J Nutri Food Sci. 2015; 3(3): 1069.

9. Jargin SV. Testing of serum atherogenicity in cell cultures: questionable data published. Ger Med Sci. 2012; 10: Doc02.

10. Jargin SV. Orekhov's Method: Reassessment of *in vitro* lipid uptake assays. Recent Pat Cardiovasc Drug Discov. 2015;.

11. Scharnagl H, März W. New lipid-lowering agents acting on LDL receptors. Curr Top Med Chem. 2005; 5: 233-242.

12. Rosenson RS. Lp-PLA(2) and risk of atherosclerotic vascular disease. Lancet. 2010; 375: 1498-1500.

13. Orekhov AN, Pivovarova EM, Sobenin IA, Yakushkin VV, Tertov VV. Use of cell culture for optimisation of direct antiatherogenic therapy with verapamil. Drugs. 1992; 44 Suppl 1: 105-110.

14. Ryong LH, Tertov VV, Vasil'ev AV, Tutel'yan VA, Orekhov AN. Antiatherogenic and antiatherosclerotic effects of mushroom extracts revealed in human aortic intima cell culture. Drug Dev Res. 1989; 17: 109-117.

15. Vertkin AL, Li ED, Pyshkina IA, Orekhov AN. Role of fish food additives in the treatment and prophylaxis of atherogenic dyslipidemia. Kardiologiia. 1994; 34: 22-28.

16. Sobenin IA. Principles of pathogenetic therapy of atherosclerosis. Dissertation. Moscow: Research Institute for Pathology and Pathophysiology. 2006.

17. Pivovarova EM. Treatment of atherosclerosis. Pokrovsky AV, editor. In: Clinical angiology. Moscow: Meditsina. 2004; 2: 712-714.

Austin J Nutri Food Sci - Volume 3 Issue 3- 2015
ISSN : 2381-8980 | www.austinpublishinggroup.com

Citation: Jargin SV. Food Supplement Development in Russia on the Basis of Cell Culture Experiments. Austin J Nutri Food Sci. 2015; 3(3): 1069.