Kerry Research

Research supporting the safety and efficacy of Kerry beta glucan ingredients is the subject of numerous peer-reviewed science and medical journal articles and presentations at scientific forums. Abstracts of these articles are available at www.wellmune.com/research.

Clinical Research

X, Zhou. Bakers yeast beta-glucan decreases episodes of common childhood illness in 1 to 4 year old children during cold season in China. American Society for Parenteral and Enteral Nutrition (ASPEN), Clinical Nutrition Week 2016. Jan. 2016.

Fuller, R.J., Moore, M.V., Lewith, G.L., Stuart, B.L., Noakes, P.S., Calder, P.C. Yeast-Derived 1,3/1,6 Glucopolysaccharide to Prevent Upper Respiratory Tract Infection and Modulate Circulating Cytokines and Chemokines in Older Adults. Presented at the Southampton Translational Clinical Research Conf., May 2014.

Li, F., Jin, X., Liu, B., Zhuang, W. and Scalabrin, D. Follow-up Formula Consumption in 3- to 4-Year-Olds and Respiratory Infections: An RCT. *Pediatrics* 2014; 133:6 e1533-e1540.

Scalabrin, D., Ribeiro, T., Peixoto de Matto, A., Zhuang, W., Stolz, S., Pontes, M., Almeida, I., Godoy, C., Gatto, S., Leal, V., Cabral, G. and Ribeiro, H. Formula with Docosahexaenoic Acid, Prebiotics, and Beta-Glucan Supports Respiratory and Skin Health in Children. April 2014. *The FASEB Journal* vol. 28 no. 1 Supplement 382.6.

McFarlin, B., Carpenter, K., Davidson, T., McFarlin, M. 2013. Baker's Yeast Beta Glucan Supplementation Increases Salivary IgA and Decreases Cold/Flu Symptomatic Days After Intense Exercise. *Journal of Dietary Supplements,*10 (3): 171-183.

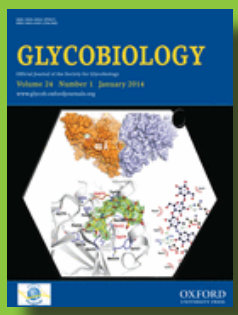
Carpenter, K.C., Breslin, W.L., Davidson, T., Adams, A., McFarlin, B.K. 2012. Baker's Yeast ß-glucan Supplementation Increases Monocytes and Cytokines Post-Exercise: Implications for Infection Risk? *British Journal of Nutrition.* May 10:1-9.

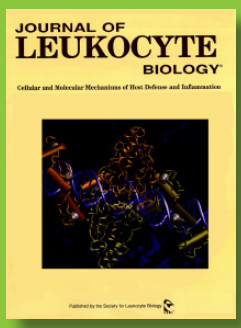
Fuller, R., Butt, H., Noakes, P., Kenyon, J., Yam, T.S., Calder, P., 2012. Influence of Yeast-Derived 1,3/1,6 Glucopolysaccharide on Circulating Cytokines and Chemokines with Respect to Upper Respiratory Tract Infections. *Nutrition* 28: 665–669.

Talbott, S., Talbott, J., Talbott, T., Dingler, E. 2012. "ß-Glucan Supplementation, Allergy Symptoms, and Quality of Life in Self-Described Ragweed Allergy Sufferers." *Food Science & Nutrition,* 10:1-12.

Talbott, S., Talbott, J. 2012. Baker's Yeast Beta-Glucan Supplement Reduces Upper Respiratory Symptoms and Improves Mood State in Stressed Women. *Journal of the American College of Nutrition*, August 2012, vol 31, no. 4, 295-300.

Talbott S., Talbott J. 2010. Beta 1,3/1,6 Glucan Decreases Upper Respiratory Tract Infection Symptoms and Improves Psychological Well-being in Moderate to Highly-Stressed Subjects. *Agro Food Industry Hi-Tech*. 21:21-24.





Harger-Domitrovich, S. G.; Domitrovich, J. W.; Ruby, B. C. 2008. Effects of an Immunomodulating Supplement on Upper Respiratory Tract Infection Symptoms in Wildland Firefighters. *Medicine & Science in Sports & Exercise*. 40(5):S353.

Feldman, S., Schwartz, H., Kalman, D., Mayers, A., Kohrman, H., Clemens, R. and Krieger, D. 2009. Randomized Phase II Clinical Trials of Wellmune® for Immune Support During Cold and Flu Season. *The Journal of Applied Research*. 9:20-42.

Talbott S., Talbott J. 2009. Effect of Beta 1, 3/1, 6 Glucan on Upper Respiratory Tract Infection Symptoms and Mood State in Marathon Athletes. *Journal of Sports Science and Medicine*. 8:509-515.

Preclinical Research

Bose, N., Wurst, R., Chan, A., Dudney, C. LeRoux, M., Danielson, M., Will, P., Nodland, S., Patchen, M., Lucca, J., Lebeda, F. and Vasilakos, J. 2014. Differential Regulation of Oxidative Burst by Distinct ß-Glucan-Binding Receptors and Signaling Pathways in Human Peripheral Blood Mononuclear Cells *Glycobiology*. doi: 10.1093/glycob/cwu005.

Goodridge, H., Reyes, C., Becker, C., Katsumoto, T., Ma, J., Wolf, A., Bose, N., Chan, A., Magee, A., Danielson, M., Weiss, A., Vasilakos, J., Underhill, D. 2011. Activation of the Innate Immune Receptor Dectin-1 upon Formation of a 'Phagocytic Synapse'. *Nature* 472, 471–475.

Driscoll, M., Hansen, R., Ding, C., Cramer, D. and Yan, J. 2009. Therapeutic potential of various ß-glucan sources in conjunction with anti-tumor monoclonal antibody in cancer therapy. *Cancer Biology & Therapy* 8:3, 216-223.

Babıcek K., Cechova, I., Simon, R. R., Harwood, M., Cox, D. J. 2007. Toxicological Assessment of a Particulate Yeast (1,3)-ß-D-glucan in rats. *Food and Chemical Toxicology*. 45(9): 1719-30.

Lavigne L. M., Albina, J. E., and Reichner, J. S. 2006. ß-Glucan is a Fungal Determinant for Adhesion-Dependent Human Neutrophil Functions. *Journal of Immunology*. 177:8667-8675.

Li, B., Allendorf, D. J., Hansen, R. D., Marroquin, J., Ding, C., Cramer, D. E., and Yan, J. 2006. Yeast ß-Glucan Amplifies Phagocyte Killing of iC3b-Opsonized Tumor Cells via Complement Receptor 3-Syk-Phosphatidylinositol 3-Kinase Pathway. *Journal of Immunology*. 177: 1661-1669.

Cramer, D. E., Allendorf, D. J., Baran, J. T., Hansen, R. D., Marroquin, J., Li, B., Ratajczak, J., Ratajczak, M. Z., and Yan, J. 2006. Beta-Glucan Enhances Complemented-Mediated Hematopoietic Recovery After Bone Marrow Injury. *Blood*. Volume 107, Number 2.

Allendorf, D. J., Yan, J., Ross, G. D., Hansen, R. D., Baran, J. T., Subbarao, K., Wang, L., and Haribabu, B. 2005. C5a-Mediated Leukotriene B4-Amplified Neutrophil Chemotaxis is Essential in Tumor Immunotherapy Facilitated by Anti-tumor Monoclonal Antibody and ß-Glucan. *Journal of Immunology*. 174(11): 7050-6.

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Yan J., Allendorf, D. J., Brandley, B. 2005. Yeast Whole Glucan Particle ß-Glucan in Conjunction with Anti-tumour Monoclonal Antibodies to Treat Cancer. *Expert Opinion on Biological Therapy*. Vol. 5, No. 5, Pages 691-702.

Tsikitis, V. L., J. E. Albina and J. S. Reichner. 2004. ß-Glucan Affects Leukocyte Navigation in a Complex Chemotactic Gradient. *Surgery*.136(2):384-389.

Hong, F., Yan, J. Baran J. T., Allendorf, D. J., Hansen, R. D., Ostroff, G., Xing, P.X., Cheung, N. V. and Ross, G. D. 2004. Mechanism by Which Orally Administered ß-1,3-Glucans Enhance the Tumorcidial Activity of AntiTumor Monoclonal Antibodies in Murine Tumor Models. *Journal of Immunology*. 173:797-806.

McNair, D. M., J. W. P. Heuchert and E. Shilony. 2003. Profile of Mood States: Bibliography 1964-2002. Toronto, Canada: Mulit-Health Systems, Inc.

Hong, F., Hansen, R. D., Yan, J., Allendorf, D. J., Baran, J. T., Ostroff, G., and Ross, G. 2002. Mechanism by which orally administered beta-1,3-glucans enhance the tumoricidal activity of antitumor monoclonal antibodies in murine tumor models. *Journal of Immunology*. 173(2): 797-806.

Analytical Research

Magee, A., Danielson, M., Feneis, A., Langeslay, R. and Will, P. 2014. An Enzymatic Method to Measure Beta-1,3-Beta-1,6-Glucan Content in Extracts and Formulated Products (GEM® assay). AOAC International 128th Annual Meeting & Expo in Boca Raton, Florida, USA.

Danielson, M., Dauth, R., Elmasry, N., Langeslay, R., Magee, S. and Will, P. 2010. Enzymatic Method To Measure ß-1,3-ß-1,6-Glucan Content in Extracts and Formulated Products (GEM Assay). *Journal of Agricultural and Food Chemistry*. 58(19): 10305-10308.

Magee, A., Danielson, M., Dauth, R., Stevenson, T. and Will, P. 2008. Analysis of Side Chain Lengths of Branched ß-1,3-Glucans by Alkaline Degradation. A poster presentation at the International Carbohydrate Symposium in Oslo, Norway.

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