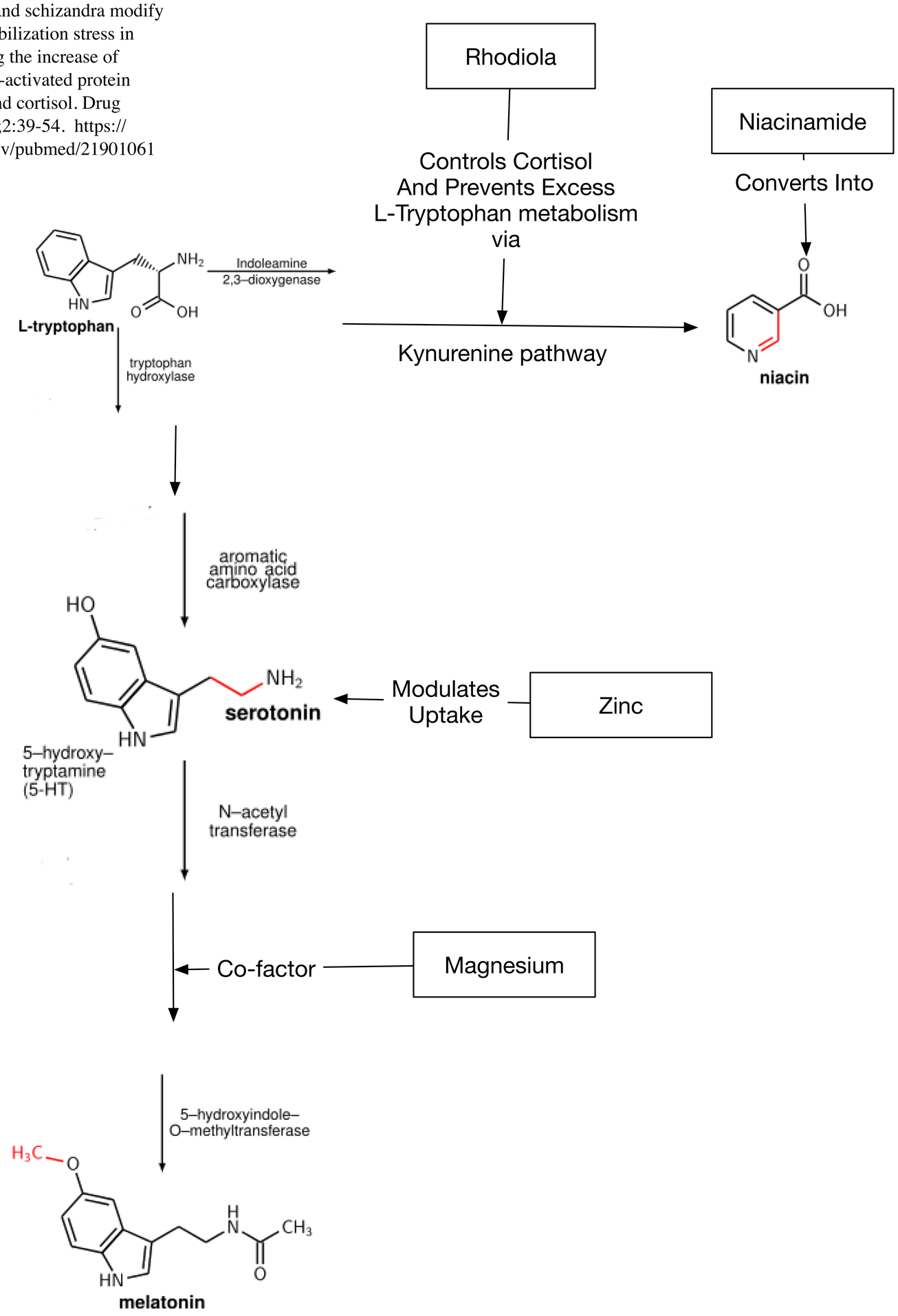
"In the placebo group, only p-SAPK/p-JNK, NO and cortisol were increased significantly (by 200-300% cf basal levels) following restraint stress, whilst in animals that had received multiple doses of adaptogens/stress-protectors, the levels of NO and cortisol remained practically unchanged after acute stress. Rhodioloside and extracts of S. chinensis and R. rosea were the most active inhibitors of stress-induced p-SAPK/p-JNK" - Panossian A, Hambardzumyan M, Hovhanissyan A, Wikman G. The adaptogens rhodiola and schizandra modify the response to immobilization stress in rabbits by suppressing the increase of phosphorylated stress-activated protein kinase, nitric oxide and cortisol. Drug Target Insights. 2007;2:39-54. https://www.ncbi.nlm.nih.gov/pubmed/21901061

The cause of serotonin deficiency in depression was attributed to the shunt of TRP "metabolism away from serotonin production towards KYN production" due to cortisol-induced activation of liver enzyme, tryptophan 2,3- dioxygenase, the rate-limiting enzyme of TRP – KYN pathway. - Oxenkrug G. Serotonin-kynurenine hypothesis of depression: historical overview and recent developments. Curr Drug Targets. 2013;14(5):514-21. https://www.ncbi.nlm.nih.gov/pubmed/23514379



"Zinc differentially modulates the serotonin uptake in vitro [22], and such complex interaction of zinc with the serotonin transporter in vivo may be responsible for the positive zinc interaction with serotonin uptake inhibitors in the FST" - Szewczyk B, Poleszak E, Sowa-kućma M, et al. Antidepressant activity of zinc and magnesium in view of the current hypotheses of antidepressant action. Pharmacol Rep. 2008;60(5): 588-9. https://www.ncbi.nlm.nih.gov/pubmed/19066406

"Exogenous magnesium (Mg) has been found to increase the activity of serotonin N-acetyltransferase, an enzyme in the pathway for melatonin synthesis" - Billyard AJ, Eggett DL, Franz KB. Dietary magnesium deficiency decreases plasma melatonin in rats. Magnes Res. 2006;19(3): 157-61.https://www.ncbi.nlm.nih.gov/pubmed/17172005

That is, exogenous nicotinamide did not affect de novo nicotinamidesynthesis. Therefore, when niacin equivalent is calculated, the intake of nicotinamide itself need not be considered as a factor that changes the tryptophan-nicotinamide conversion ratio.- Fukuwatari T, Shibata K. Effect of nicotinamide administration on the tryptophan-nicotinamide pathway in humans. Int J Vitam Nutr Res. 2007;77(4):255-62. https://www.ncbi.nlm.nih.gov/pubmed/18271280