The red clover (Trifolium pratense) isoflavone biochanin A inhibits aromatase activity and expression.

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Biochanin A is an isoflavone isolated from red clover (Trifolium pratense), and is a commercially available nutraceutical for women suffering from postmenopausal symptoms. Isoflavones resemble the structure of oestrogen, and display agonistic and antagonistic interactions with the oestrogen receptor. Overexposure of oestrogen is a major contributing factor in the development of breast cancer, and cytochrome P450 (CYP) 19 enzyme, or aromatase, catalyses the reaction converting androgen to oestrogen. In the present study the effect of biochanin A on the gene regulation and enzyme activity of aromatase was investigated. By assaying MCF-7 cells stably transfected with CYP19, biochanin A inhibited aromatase activity and hampered cell growth attributing to the enzyme activity. In addition, 25 microm-biochanin A significantly reduced CYP19 mRNA abundance in the oestrogen receptor-negative breast cancer cells SK-BR-3. The transcriptional control of the CYP19 gene is exon-specific, and promoter regions I.3 and II have been shown to be responsible for CYP19 expression in SK-BR-3 cells. Luciferase reporter gene assays also revealed that biochanin A could repress the transcriptional control dictated by the promoter regulation. Interestingly, genistein did not inhibit aromatase but it might down regulate promoter I.3 and II transactivation. Since genistein is a major metabolite of biochanin A, it might contribute to biochanin A’s suppressive effect on CYP19 expression. The present study illustrated that biochanin A inhibited CYP19 activity and gene expression.

PMID: 17761019 [PubMed - indexed for MEDLINE]