Rahimuddin, S.A.[a] , Khoja, S.M.[a] , Zuhair, M.M.[a] , Howell, N.K.[a b] , Brown, J.E.[b c]
Inhibition of lipid peroxidation in UVA-treated skin fibroblasts by luteolin and its glucosides
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[a] Biochemistry Department, Faculty of Science, King Abdulaziz University, Jeddah, Saudi Arabia
[b] Division of Nutrition, Dietetics and Food Sciences, School of Biomedical and Molecular Sciences, University of Surrey, Guildford, Surrey, United Kingdom
[c] Division of Nutrition, Dietetics and Food Sciences, School of Biomedical and Molecular Sciences, University of Surrey, Stag Hill, Guildford, Surrey GU2 7XH, United Kingdom

Abstract
Ultraviolet A (UVA) radiation causes oxidative damage to human skin cells. This damage may be reduced or prevented using plant compounds as photoprotectants. To investigate the relationship between chemical structure and UVA-protective activity, three structurally related flavonoids, namely luteolin, luteolin-7-O-glucoside (both present in artichoke) and luteolin-4′-O-glucoside (present in wild carrot), were studied. Human skin fibroblasts exposed to UVA (250 and 500 kJ/m2) were treated with each flavonoid (30 μM) for 18 h prior to irradiation. The extent of lipid peroxidation in the cellular extracts was assessed as lipid peroxides and malondialdehyde (MDA). Luteolin and luteolin-7-O-glucoside both prevented a significant increase in lipid peroxides at 250 kJ/m2, but at 500 kJ/m2 their effectiveness was clearly attenuated. Contrastingly, luteolin-4′-O-glucoside was pro-oxidant at both radiation doses. Measurements of MDA levels highlighted that luteolin was clearly more effective than the two glucosides at both 250 and 500 kJ/m2. Overall, these results show clear differences between the three flavonoids and suggest that the B ring 3′,4′-dihydroxy group, lacking in luteolin-4′-O- glucoside, may be particularly important. Flavonoid: transition metal ion chelation studies confirmed the influence of the 3′,4′-dihydroxy group, which is also relevant to the quenching of singlet oxygen. These features as well as the greater lipophilic nature of luteolin together explain the superior activity of this flavonoid which may be potentially useful as a supplement in photoprotective skin preparations. © 2007 WILEY-VCH Verlag GmbH & Co. KGaA, Weinheim.

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Flavonoid; Flavonoid glucosides; Lipid peroxidation; Metal chelation; Ultraviolet A

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