In this issue

Lactoferrins

Lactoferrin, as the name implies, is a protein component in milk that binds iron. The protein has also been shown to occur in many exocrine secretions and in leucocytes. Diverse functional roles have been attributed to the lactoferrins. While the sequestration of iron may be a major role, lactoferrin has been implicated in 'immune and inflammatory responses, as an antibacterial agent, as a growth factor and as an antifungal agent'. Indeed a potent antimicrobial peptide, lactoferrin B is derived from bovine lactoferrin (Hwang *et al.*, *Biochemistry*, 1998, **37**, 4288).On **page 241**, Karthikeyan *et al.* review their studies on the structures of lactoferrins obtained from the colostrum of animals. Crystal structures have been determined for several forms of lactoferrins from diverse sources. These structural analyses provide a rationale for the ability of lactoferrins to sequester iron and also provide glimpses of the possibility that larger molecules like indole quinones might also find binding sites on the protein.

Caffeine as an antioxidant

Reactive oxygen species, hydroxyl radical (•OH), superoxide ($O_2^{\bullet-}$) and peroxide (O_2^{2-}) are commonly held responsible for oxidative damage in cells and tissues. Antioxidants are thus widely promoted as agents that act as protectants against the physiological ravages caused by oxidative stress. Vitamin E (tocopherol) is a commonly prescribed antioxidant, with many consumers cherishing the fond hope that both health and longevity may be enhanced by keeping oxidative damage at bay. Other common sources of antioxidants (chemicals that quickly neutralize reactive oxygen species) are tea (green tea is particularly rich in desirable ingredients) and green vegetables. Various disorders of human health like cancer, cardiovascular disease, and inflammation have been linked to oxidative damage. Aging is also accompanied by slow and inexorable oxidative stresses. On **page 286**, Kamat *et al.* have reported an analysis of the possible mechanisms by which caffeine acts as an antioxidant. Their experimental system is simple. Rat liver mitochondria are irradiated with ^{60}Co γ-rays and the activity of superoxide dismutase (SOD), an enzyme that breaks down superoxide is monitored. Their result establishes that radiation-induced loss of SOD activity is prevented by high concentrations of caffeine. These authors had earlier reported the action of caffeine as a radioprotectant (*J. Radiol. Protection*, 1991, **19**, 171), in a study that promoted an estimate that 100 cups of coffee might be necessary to protect a 70 kg individual against similar radiation exposure (*New Scientist*, 1999, 26 June, p. 12)!

Kamat *et al.* conclude on a note that should please many readers – Caffeine consumption in the form of tea, coffee or cola-containing beverages is considerable in most human populations. Thus, our present study suggests an additional positive attribute of this compound.

P. Balaram

Interplanetary and geomagnetic disturbances

Solar phenomena like solar flares are known to affect telecommunication, performance of satellites and so on. In addition there has been an old concept that solar flares and isolated filament eruptions cause major transient interplanetary disturbances and geomagnetic storms. The space borne imaging instruments have allowed for a better understanding of the solar–terrestrial links. As a result a new paradigm that the coronal mass ejection (CME), a part of which is associated with solar activity and filament eruptions is now believed to be the crucial link between solar activity and transient disturbances on the Earth. CMEs are vast structures of plasma and magnetic fields that are expelled from the sun into the heliosphere. CMEs drive large geomagnetic storms and their attendant effects like auroral displays. Transient interplanetary shocks are also produced by the fast CMEs.

1989 was one of the maximum solar activity years; during this year as many as 20 storms occurred. Out of these 20 storms, 13 are sudden commencement storms and 7 gradual commencement storms. S. C. Dubey and A. P. Mishra have presented results of their analysis of the parameters of these storms in their paper (**page 293**); based on this analysis they have established that the storms are associated with CME events similar to Gosling's results; Gosling had analysed some 37 storms that occurred during an earlier period 1978–82. Dubey and Mishra's results indicate that large geomagnetic storms are associated with CMEs during maximum of solar activity. In addition the authors have taken up two specific storms observed during 1989 for detailed comments in relation to supersonic shocks or magnetic clouds.

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