Elimination of Efficacy by Additives in Zinc Acetate Lozenges for Common Colds

Str—Upon reviewing the recently published report by Turner et al. [1] about the effects of zinc gluconate or zinc acetate lozenges on experimental and natural rhinovirus colds, I realized that I have some information that was inadvertently omitted and that is necessary to accurately discern the meaning of the report.

As a zinc ion availability (ZIA) consultant for Warner Lambert, I found that the 5 and 11.5 mg zinc lozenges whose formula was reported by Turner et al. [1] had theoretical ZIA values of 12 and 36, respectively. On the basis of ZIA analytical methods reported elsewhere [2], zinc acetate lozenges having these ZIA values (strengths) should have reduced the duration of colds by ~1 and ~2.7 days, respectively. However, hydrogenated palm kernel and cotton seed oils were also constituents of the lozenges, according to the list of ingredients provided with the commercial product (Halls Zinc Defense) marketed by Warner Lambert, which is also the supplier of the zinc acetate lozenge clinical prototypes studied by Turner et al. [1]. At the high temperatures (157°C) used in the manufacture of hard candy, these ingredients react with positively charged zinc ions (Zn$^{2+}$ ions) derived from zinc acetate to yield zinc oleate, stearate, and palmitate waxes, which are incapable of releasing Zn$^{2+}$ ions. Consequently, the ZIA value of the zinc acetate lozenges was 0, and no effect on colds could have been expected or resulted.

ZIA calculations involve, as variables, both the concentration of Zn$^{2+}$ ions in saliva (calculated from the amount of zinc, the fraction of zinc ionizable at physiologic pH, and the total amount of saliva generated per lozenge dissolved) and duration of contact with oral mucosa (calculated from the dissolution time of lozenges and number of lozenges per day), and they must take into account Fick’s law of membrane permeability. Therefore, efficacy is not determined by the theoretical ZIA value but by the actual value, which takes into account the effect of additives. [2].

Attention to these omissions is critical if we wish to learn the effects of treating common colds with zinc lozenges, and if we wish to reconcile the negative report of Turner et al. [1] with the very positive reports of Petrus et al. [3] and Prasad et al. [4]. For example, Prasad et al. [4] showed that 50% of zinc acetate recipients were well in 3.8 days, compared with 7.7 days for 50% of placebo recipients. This duration data corresponds well with other generally accepted data [5].

In the report by Turner et al [1], the actual zinc compound exposed to the oral mucosa was not zinc acetate, but nonmiscible fat complexes of zinc. The zinc acetate lozenges were not described as producing a dry or astringent feeling in the mouth; in all cases where the ZIA value is sufficiently high to allow Zn$^{2+}$ ions to shorten the duration and severity of common colds, there has been and there will be a dry or astringent feeling in the mouth. This dry feeling is identical to the “clean” mouth feeling produced by swishing water in the mouth for 30–60 s.

The cumulative effect of the above omissions teaches readers that zinc acetate lozenges in general do not have efficacy against common cold; however, properly made zinc acetate lozenges work very well in reducing the duration of common colds.

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References
3. Petrus, EJ, Lawson, KA, Bucci LR, Blum K.