

# Bismuth salicylate for diarrhea in children

Ran D. Goldman MD FRCPC

## Abstract

**Question** Recently, I had a visit from a 5-year-old patient who had been given bismuth subsalicylate for a diarrheal illness by a local family physician during a trip to South America. Is this a practice we should encourage?

**Answer** Research from developing countries has found the use of bismuth subsalicylate to be effective in shortening the duration of diarrheal illness. Despite these findings, its limited effectiveness and concerns about it potentially causing Reye syndrome, compliance, and cost are the key reasons it is not routinely recommended for children.

**B**ismuth salicylate is a derivative of salicylic acid, hence its potential anti-inflammatory and antibactericidal action. Bismuth subsalicylate (which has various trade names) is a colloidal substance obtained by hydrolysis of bismuth salicylate.

Bismuth subsalicylate in combination with zinc salts has been a known treatment for diarrhea since the early 1900s, and it was used to treat sick infants, mostly suffering from cholera.<sup>1</sup> Some studies suggest that bismuth subsalicylate inhibits intestinal secretion caused by enterotoxigenic *Escherichia coli* and cholera toxins.<sup>2</sup> This finding gained support in one study that found that bismuth subsalicylate was associated with clearance of pathogenic *E coli* from the stools of 100% of treated children but was not associated with rotavirus elimination.<sup>3</sup>

## Randomized controlled trials

In 1993 the *New England Journal of Medicine* published the results of a randomized placebo-controlled trial examining 275 Peruvian boys (mean age 13.5 months) who were given bismuth subsalicylate (100 or 150 mg/kg of body weight per day for up to 5 days) together with oral rehydration therapy. Duration of diarrheal illness was significantly shorter among those receiving bismuth subsalicylate (either dose) compared with those receiving placebo ( $P=.019$ ,  $P=.009$ ), measured as diarrhea resolution at 120 hours after admission. The number of patients that needed to be treated was 7 to 8. Furthermore, total stool output ( $P=.015$ ), total intake of oral rehydration solution ( $P=.013$ ), and duration of hospitalization ( $P=.005$ ) were also shorter for treated children.<sup>4</sup>

In another double-blind, placebo-controlled study from Chile,<sup>3</sup> a dose of 20 mg/kg of bismuth subsalicylate was given 5 times daily for 5 days as an adjunct to rehydration therapy in 123 children 4 to 28 months of age who had acute diarrheal illness that was severe

enough to necessitate hospitalization. The investigators reported a substantial reduction in duration of hospital stay when children were given bismuth subsalicylate (total stay of 6.9 days) compared with patients receiving placebo (8.5 days). The investigators also found a substantial decrease in stool frequency and stool weight, as well as an improvement in stool consistency, improved clinical well-being, and shortening of the disease duration.

A third double-blind randomized controlled study from Bangladesh assessed children 4 to 36 months of age with acute diarrhea.<sup>5</sup> A dose of 100 mg/kg daily of liquid bismuth subsalicylate for 5 days resulted in a milder and shorter duration of illness compared with those treated with placebo, although this difference was not significant ( $P=.057$ ).

In all studies,<sup>3-5</sup> bismuth subsalicylate was well tolerated with no reported adverse effects, and when serum salicylate and bismuth levels were measured, there was no evidence of toxicity found for any dose given.

## Further considerations

Although evidence from trials seems to show the benefit of bismuth subsalicylate in diarrhea, especially in developing countries, several concerns have been raised. In 1993, Snyder discussed the issue of the cost of bismuth subsalicylate products.<sup>6</sup> While prices have changed over time, there is no current study about the cost-effectiveness of bismuth subsalicylate products to suggest if developing countries should consider their wide use.

Other concerns expressed by the American Academy of Pediatrics<sup>7</sup> include insufficient data to assess the risk of Reye syndrome in children receiving salicylate therapy, as well as the potential lack of compliance with a medication given every 5 hours for 5 days. Finally, a very

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benign but surprising side effect of bismuth subsalicylate includes black discoloration of the tongue<sup>8</sup> and melena.<sup>9</sup>

### Conclusion

Studies conducted in developing countries found the use of bismuth subsalicylate for diarrhea was effective in shortening the duration of illness; however, despite these findings, potential risks of Reye syndrome and compliance challenges inhibit recommendations to use bismuth subsalicylate in children with diarrhea. 🌿

### Competing interests

None declared

### Correspondence

Dr Ran D. Goldman, BC Children's Hospital, Department of Pediatrics, Room K4-226, Ambulatory Care Bldg, 4480 Oak St, Vancouver, BC V6H 3V4; telephone 604 875-2345, extension 7333; fax 604 875-2414; e-mail [rgoldman@cw.bc.ca](mailto:rgoldman@cw.bc.ca)

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