

Association between *Streptococcus bovis* and Colon Cancer

We read with great interest the article by Marcella Beck and colleagues (1). We fully support their recommendation that proper distinction between the "*Streptococcus bovis*" strains belonging to *Streptococcus galloyticus* and *Streptococcus infantarius* (previously biotypes I and II/2, respectively) should be made in future studies to obtain a clear picture of the disease associations of these opportunistic pathogens; above all, because proper bacterial classification and subsequent recognition of their association with colon cancer can be a life-saving event for *S. bovis*-infected individuals with undiagnosed colon cancer (4, 5, 8). We were therefore somewhat puzzled by the authors' conclusion that the association between *S. bovis* bacteremia and colon cancer (7%) may not be as strong as previously thought.

Beck and colleagues based their conclusion on the finding that 3 out of 46 individuals with *S. bovis* bacteremia presented with a coincidental colon carcinoma. The authors recognize, however, that only 15 of these 46 patients underwent full bowel examination and that in the other patients asymptomatic colon tumors could be missed. In two cited papers, Ruoff et al. (6) and Corredoira et al. (2) report respective associations of 100% and 57% for the association of *S. bovis* biotype I and colon cancer in patients that underwent colonoscopy. Importantly, these associations also took into account the presence of premalignant adenomas that are generally regarded as (early-stage) precursors of carcinomas. In fact, Corredoira et al. (3) recently reported that upon examination by colonoscopy, 4 carcinomas and 25 adenomas were detected in 46 *S. bovis* type I-infected patients (together, 63%). This confirms the notion that *S. bovis* can also associate with (pre)malignant colonic lesions, which in general do not cause symptoms and cannot be detected by fecal occult blood tests, and use these as a portal of entry to cause endocarditis or bacteremia in susceptible individuals (7, 9). In this view, it was interesting to notice that Beck and colleagues reported eight additional cases of benign colon disease which may very well be carcinogenic precursors. Considering all 21 recorded *S. bovis* type I bacteremia cases, this association then would be 33% (5 benign cases/2 carcinomas) or 47% assuming that all benign and malignant colon diseases were detected by colonoscopy (5 benign cases/2 carcinomas out of 15 colonoscopies). Both of these numbers fit within the long line of reports describing a wide range of associations, with an average of about 40% (1978 to 2008; our unpublished literature surveys). This wide range can partly be attributed to the lack of a proper distinction between *S. bovis* type I (*S. galloyticus*) and type II (*S. infantarius*) and the fact of whether or not colonoscopic examination was performed. On the other hand, it is also likely that these associations can fluctuate in time and geographical regions, as discussed by Beck and colleagues.

Taken together, we believe that the association between *S. bovis* and colon cancer (defined as carcinomas and premalignant adenomas) should not be underestimated and that full bowel examination is highly recommendable for patients that present with *S. bovis* bacteremia, especially when it concerns *S. galloyticus* subsp. *galloyticus* (biotype I).

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