Simonsiella Filaments Isolated from Erosive Lesions of the Human Oral Cavity

GIANNI CARANDINA,1,* MARIO BACCHELLI,1 ANNAROSA VIRGILI,1,2 AND RENATA STRUMIA2
Laboratorio Analisi Chimico-Cliniche e Microbiologia, Ospedale "Borselli," I-44012 Bondeno, Ferrara,1 and Clinica Dermatologica dell'Università di Ferrara, Corso della Giovecca 203, 44100 Ferrara,2 Italy

Received 15 November 1983/Accepted 21 February 1984

The morphology and cultural characteristics of bacteria of the Simonsiella genus isolated from erosions of oral mucosa are reported here. Direct microscopic examination of smeared oral swabs and the consequent selection of suitable culturing procedures and media are compulsory for recovering Simonsiella microorganisms from clinical specimens in routine work.

Filamentous bacteria of the Simonsiella genus, now belonging to the order Cytophagales (14), were described in the early 1920s as apparently harmless saprophytes which inhabit the oral cavity of humans and a variety of warm-blooded vertebrates (3, 12).

Scarcely are seen the changes in the prevalence of Simonsiella spp. which have been documented in humans in different periods and in different parts of the world (2-4, 6, 7, 12). This could be due to dietary, hereditary, or systemic factors of the host (5). Most probably, Simonsiella microorganisms are transient inhabitants of the oral cavity of humans, which may fluctuate in number so that they are harvested only under the appropriate combination of circumstances (2).

Only a few articles have been published in the last 20 years in which these microorganisms have been described in humans (2, 4, 6, and 7), and to our knowledge, there have been no cases reported since 1974. We considered an additional report to be appropriate to alert clinical microbiologists of the need to examine for Simonsiella spp. in erosive lesions of the oral mucosa and to stress the methodology that we found to be successful for their isolation.

By chance, we found Simonsiella microorganisms in the course of utilizing exfoliative cytology to help evaluate the erosive lesions of the inner surface of cheeks in a 58-year-old woman. The erosions were thought to be the result of an erosive lichen planus or denture trauma since the microscopic examination of oral scrapings from the lesions revealed a quantity of large bacillary forms stuck on the epithelial cells. They were recognized as belonging to the genus Simonsiella Schmid 1922 (14) because of their unique metameric aspect, which reminded one of segmented tapeworms or insect larvae (12), and because of the rounded tips of the filaments (14).

Each filament (6 to 8 μm long, 2 to 3 μm wide) consisted of segmented groups of cells which were aligned face to face in juxtaposition so that their short axis coincided with the long axis of the filament (Fig. 1). They were gram negative.

Scanning electron photomicrographs of oral swabblings, smeared as for staining onto glass microscope slides (10 by 10 mm), air dried, and coated with gold, revealed both flattened (Fig. 2) and convex, apparently cylindrical, multicellular (Fig. 3) filaments. Defined fibrillar surface structures were seen on the contour of both types of filaments, to which they gave a "fuzzy" appearance which is common to various Simonsiella strains (11).

Simonsiella colonies were obtained from oral samples taken with cotton swabs from the erosions and immediately rolled over serum-enriched agar plates without any prior suspension and agitation in nutrient broth, as Simonsiella spp. do not suspend well in broth, water, or saline solutions (1, 3, 10), and some strains may fail to grow after such treatment (10). As primary culture medium, we used Bystsy agar by the method of Kuhn et al. (5), which consisted of tryptic soy broth without glucose (2.75% [wt/vol]; Difco Laboratories), yeast extract (0.4% [wt/vol]; Difco), distilled water, agar (1.5% [wt/vol]; Difco), and bovine serum (10% [vol/vol]; Oxoid Ltd.), which was added after the rest of the medium was autoclaved and cooled to 45°C. After 6 to 10 h of incubation in an aerobic environment at 37°C, the agar surface was scanned microscopically with a ×10 objective lens, and Simonsiella microcolonies were detected by the septated morphology of the filaments (Fig. 4). At this stage, or shortly thereafter, the filaments were "fished" with a dissection needle while the plate was viewed under the microscope, as suggested by Steed (13) and Kuhn et al. (5), and were transferred to other Bystsy agar plates. The 24-h-old new colonies were low convex and small (maximum diameters, 1.0 to 1.5 mm), opaque and pale, and smooth. They were cytochrome-oxidase positive. The filaments showed an average width of 2.2 to 3.5 μm, with the length of the single bacterial cells being 0.5 to 0.8 μm.

Biochemical tests were performed by the method of Kuhn et al. (5). Esculin and starch were not hydrolyzed, indole was not produced, and urea was not decomposed. The nitrate reduction test was negative. Hemolysis was produced within 48 h on 5% defibrinated sheep blood agar plates. Decomposition of hydrogen peroxide was very poor. Acid was produced from glucose and maltose but not from sucrose or mannitol.

Certainly, the serum-enriched medium described by Kuhn et al. (5) must be considered of primary importance for isolation and maintenance of Simonsiella strains, as indirectly suggested by the unsuccessful or only partially successful results previously obtained by Mueller (9), Simons (12), and Fellinger (3) and more recently by Steed (13) and Berger (1). The procedural steps to be emphasized are that (i) oral swabblings must be placed directly and without delay on Bystsy agar plates, (ii) incubation temperature of 37°C must

* Corresponding author.
be strictly respected, and (iii) primary incubation time, after which *Simonsiella* filaments must be transferred to other BSTSY agar plates, should not exceed 10 to 14 h. In fact, any longer primary incubation time may cause *Simonsiella* spp. to be overgrown by other, more rapidly growing bacteria, especially streptococci (5), which are normally present in clinical samples from the human mouth.

Other points to be considered concern the sampling procedure, i.e., (i) cotton swabs must be rubbed on the mucosa and not simply touch it, because *Simonsiella* spp. are tightly stuck on the epithelial cells by means of their fibrillar “fuzzy coat” (8, 11), and (ii) areas with erosive lesions are most likely to harbor *Simonsiella* filaments (2), as they seem to enjoy some advantage when a high rate of sloughing of squamous cells from the epithelium takes place (8). On the contrary, inflammatory or suppurative lesions or both usually do not contain these microorganisms (3, 12).

The choice of the most suitable culturing procedures and media, properly oriented by the direct microscopic examination of any clinical specimens, should very likely improve the recovery of *Simonsiella* microorganisms from the mouth of humans.

With regard to the frequency that this bacteria may be isolated from erosive oral lesions, our findings of *Simonsiella* spp. in a single patient from a series of 122 patients fit with data reported by others, who determined that *Simonsiella* spp. was present in 2 of 277 oral scrapings (4) and in 3 of more than 600 oral scrapings (2).

In our opinion, the practice of searching for *Simonsiella* spp. in oral lesions may reveal that this organism is more common than recently thought.

**LITERATURE CITED**


