Expanded Clinical Spectrum of Infections Caused by
Proteus penneri

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Seven strains of Proteus penneri from seven abdominal wounds (after bowel resection), five urine samples, and
eight other sites were isolated in mixed cultures. Seven urine isolates were in pure cultures. All infections were
nosocomially acquired, indicating that complete identification of P. penneri in the clinical laboratory is
warranted.

In 1982, the name Proteus penneri sp. nov. was proposed for a group of bacteria previously known as Proteus vulgaris
indole negative or P. vulgaris biogroup 1 (2). The authors had only 20 strains, for which there was little information on
clinical significance. This prompted laboratories to examine isolates of the species to determine more precisely their
susceptibilities to antibiotics, their biochemical reactions, and their particular role in human infections (1, 4, 6, 7). In
addition to their resistance to chloramphenicol, a species characteristic (2), they have been found typically resistant to
cefazolin and cefsulodin; a few strains are also resistant to amikacin, piperacillin, and cefoperazone (1). Most strains
are susceptible to cefotaxime and ceftriaxone, and all strains tested have been found highly susceptible to ceftriaxone,
ceftazidime, moxalactam, cefoxitin, gentamicin, tobramycin, and netilmicin (1). An interesting observation in one
study (6) was that all P. penneri and 26% of the Proteus mirabilis isolates produced a green color reaction with
Kovacs reagent, indicating that tryptophan is metabolized by these bacteria in a manner different from that of the
indole-positive members of the tribe Proteae.

Examination of the literature for reports on indole-
negative P. vulgaris before 1982 indicated that the species
occurred in human specimens but was not given special
attention apart from its negative reaction in the test for
indole production (3, 5, 8). The first reported case of an
infection attributed to P. penneri implicated the bacterium as
a pathogen of the urinary tract and suggested a role for it in
the formation of struvite stones (4). Its presence in stools has
been observed, but there was no evidence to suggest it was

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causative agent of diarrhea (7). In the present report, we
describe isolations of P. penneri, not only from urine but
also from wounds and various other sites, indicating an
extended clinical spectrum of infections.

Isolates were differentiated from other Proteus species on
the basis of biochemical reactions cited as characteristic of
the species (2). These included negative reactions for indole
production at 48 h, negative reactions for acid production
from salicin and esculin, and resistance to chlorampheni-
col. It should be noted that commercially prepared kits
for identification of gram-negative bacteria generally do
not include materials for performing some or all of these
tests.

All infections occurred over a 2-year period in two acute-
care hospitals in Toronto. The infections were all
nosocomially acquired, and there was no evidence to suggest
cross infections. Altogether, 13 isolates were from 12 fe-
males and 14 isolates were from 14 males (Table 1.). The
most frequent source was urine, and 7 of the 12 strains from
urine samples were isolated in pure cultures. The abdominal
wound, after bowel resection, was the next most frequent
source, but isolates were also obtained from eight other
sites. The patient age range was from 2 to 84 years. Except
for the infection in the 2-year-old, the range was from 54 to
84 years, with a mean of 71.7 years. The occurrence of P.
penneri organisms in the normal intestine (7) accounts for
their higher frequency in urinary tract infections and for their
role as opportunistic invaders after surgery. In fact, P.
penneri was isolated from 11 of the 26 participating patients
(42.3%) after abdominal or other surgery.

Although the number of cases in this study is limited, it is
clear that P. penneri is yet another agent capable of causing
nosocomial disease and thus warrants complete identifica-
tion and speciation in the clinical laboratory, even though
this entails performing some biochemical tests in addition to
those routinely used for members of the family Enterobac-
teriaceae.
TABLE 1. Epidemiological and clinical features of P. penneri infections

<table>
<thead>
<tr>
<th>Patient age and sex</th>
<th>Isolation source</th>
<th>Culture yield</th>
<th>Other isolates</th>
<th>Clinical observations</th>
</tr>
</thead>
<tbody>
<tr>
<td>84. Male*</td>
<td>Urine</td>
<td>Pure</td>
<td>—</td>
<td>Indwelling urine catheter</td>
</tr>
<tr>
<td>2. Female</td>
<td>Urine</td>
<td>Mixed</td>
<td>Proteus mirabilis, enterococcus</td>
<td>—</td>
</tr>
<tr>
<td>74. Male</td>
<td>Urine</td>
<td>Pure</td>
<td>Klebsiella pneumoniae</td>
<td>Urinary reflux</td>
</tr>
<tr>
<td>72. Female</td>
<td>Conjunctiva</td>
<td>Mixed</td>
<td>Escherichia coli, Klebsiella pneumoniae</td>
<td>—</td>
</tr>
<tr>
<td>54. Male</td>
<td>Abdominal wound</td>
<td>Mixed</td>
<td>Escherichia coli, Proteus vulgaris, enterococcus</td>
<td>No catheter</td>
</tr>
<tr>
<td>84. Female</td>
<td>Groin wound</td>
<td>Mixed</td>
<td>Klebsiella ozaenae, enterococcus</td>
<td>Cerebrovascular accident</td>
</tr>
<tr>
<td>63. Male</td>
<td>Abdominal wound</td>
<td>Mixed</td>
<td>Proteus mirabilis, Klebsiella pneumoniae</td>
<td>Peritonitis</td>
</tr>
<tr>
<td>56. Male</td>
<td>Abdominal wound</td>
<td>Mixed</td>
<td>Enterobacter cloaca, Pseudomonas aeruginosa</td>
<td>Ulcerative colitis, colon resection</td>
</tr>
<tr>
<td>75. Female</td>
<td>Urine</td>
<td>Pure</td>
<td>Enterobacter cloaca, Pseudomonas aeruginosa, Klebsiella pneumoniae, enterococcus</td>
<td>Indwelling urine catheter</td>
</tr>
<tr>
<td>67. Female</td>
<td>Hip wound</td>
<td>Unknown</td>
<td>Enterobacter cloaca</td>
<td>Carcinoma of colon with resection</td>
</tr>
<tr>
<td>60. Female</td>
<td>Abdominal wound</td>
<td>Mixed</td>
<td>Enterobacter cloaca, Pseudomonas aeruginosa</td>
<td>Chronic obstructive lung disease, pneumonia</td>
</tr>
<tr>
<td>66. Male</td>
<td>Abdominal wound</td>
<td>Mixed</td>
<td>Pseudomonas aeruginosa, Candida albicans</td>
<td>Axillofemoral bypass</td>
</tr>
<tr>
<td>65. Female</td>
<td>Urine</td>
<td>Pure</td>
<td>Enterococcus</td>
<td>Peripheral vascular disease</td>
</tr>
<tr>
<td>69. Male</td>
<td>Sputum</td>
<td>Mixed</td>
<td>Escherichia coli, enterococcus</td>
<td>Carcinoma of tongue with resection</td>
</tr>
<tr>
<td>76. Male</td>
<td>Groin wound</td>
<td>Mixed</td>
<td>Staphylococcus aureus, Proteus mirabilis, Pseudomonas aeruginosa</td>
<td>Indwelling urine catheter</td>
</tr>
<tr>
<td>78. Female</td>
<td>Ankle ulcer</td>
<td>Mixed</td>
<td>Staphylococcus aureus, Staphylococcus pseudomonas, diphtheroids</td>
<td>Adhesions with bowel obstruction</td>
</tr>
<tr>
<td>57. Male</td>
<td>Neck wound</td>
<td>Mixed</td>
<td>Enterococcus</td>
<td>Indwelling urine catheter</td>
</tr>
<tr>
<td>81. Male</td>
<td>Urine</td>
<td>Pure</td>
<td>Enterococcus</td>
<td>Indwelling urine catheter</td>
</tr>
<tr>
<td>82. Female</td>
<td>Urine</td>
<td>Mixed</td>
<td>Escherichia coli, enterococcus</td>
<td>Indwelling urine catheter</td>
</tr>
<tr>
<td>74. Male</td>
<td>Abdominal wound</td>
<td>Mixed</td>
<td>Enterococcus, Staphylococcus pseudomonas, diphtheroids</td>
<td>Proctitis</td>
</tr>
<tr>
<td>82. Male</td>
<td>Urine</td>
<td>Pure</td>
<td>Diphtheroids</td>
<td>Indwelling urine catheter</td>
</tr>
<tr>
<td>78. Male</td>
<td>Urine</td>
<td>Mixed</td>
<td>Diphtheroids</td>
<td>Indwelling urine catheter</td>
</tr>
</tbody>
</table>

* Details of the infection of this patient have been described previously (4).

— None found.

LITERATURE CITED