DETERMINATION OF DOMINANT SEROVARS OF 
LISTERIA MONOCYTOGENES 

SAEED MIRDAMADI, MSc, NASRIN MOAZAMI, PhD, 
AND SHAHNAZ RAFIEE TEHRANI, PhD* 

From the Biotechnology Department, Iranian Research Organization for Science & Technology (IROST), 
P.O. Box: 15815-3538 Tehran, 15819, and the *Immunology Department, Tehran University of Medical 
Sciences, Tehran, Islamic Republic of Iran. 

ABSTRACT 

Serovars of Listeria monocytogenes were determined. Sera of aborted samples 
(200) were collected from different hospitals in Tehran and were tested serologically 
by immunofluorescent antibody methods (IF tests). 137 positive sera were 
identified. Positive sera were tested against 12 serovars of Listeria monocytogenes 
separately. Titers of antibody in patients’ sera for all serovars were determined. 
The results showed that the dominant serovars of L. monocytogenes which caused 
listeriosis in the samples were 4b, 1a, 2 and 3. None of the sera had antibodies 
against serovars 4a, 6a or 6b. Some of the sera which had high titers of antibody 
against dominant serovars (4b, 1a, 2 and 3), showed a faint result with serovars 4d, 
4e, 5 and 7. 


INTRODUCTION 

Listeria monocytogenes, a small gram positive rod which shows beta hemolysis in sheep blood agar, was first isolated 
by Murray et al. in 1926,1 as a result of their investigation of 
an epidemic of perinatal infection among a colony of rabbits. 
Since then the organism has been isolated with increasing 
frequency from man, particularly during the newborn 
period.23 
This microorganism is pathogenic for many animals, 
such as mammals and birds.3 Handling of these animals and 
drinking infected milk cause infection in man.34-7 
In 1981, 34 cases of perinatal listeriosis, including 16 
delities, occurred in the maritime province of Canada during 
a seven month period.8 
Gray and Seeliger in 1963 first reported human infections 
by Listeria monocytogenes. Lashkari et al. found three 
positive cultures of Listeria monocytogenes among 100 
abortion cases in 1974 in Iran.9 In 1979 she and her colleague 
reported ocuoglandular infection in Iranian patients.10 In 
this study, we bacteriologically tested 200 abortion samples, 
among which five were positive.21 
This investigation was designed to find the serovars of 
L. monocytogenes which cause listeriosis in Iran. 
The genus listeria is divided into four main serologic 
types and 11 subtypes (7 main types according to Seeliger).12 
The detailed antigenic stucture of listeria species was 
studied by L. Grayi and L. Murrayi.12 

MATERIALS & METHODS 

Samples obtained from 200 aborted cases were tested 
erologically to determine whether the sera have antibody 
against Listeria monocytogenes. Positive sera were stored at 
-70°C. 
Plasma protein-antisera (gammaglobulin-fraction) 
fluorescein conjugate was obtained from Behring. All the 
reagents were prepared in PBS (Phosphate Buffered Saline 
ph 7.6). 
Serogroups of In (PTCC 1294), 2 (PTCC 1295), 3 (PTCC 
1296) 4a (PTCC 1297), 4b (PTCC 1298), 4d (PTCC 1301),
Serovars of L. monocytogenes

Serovars 1a, 2, 3 and 4b showed strong reactions with titres of 1600 and 3200 in some cases (Table 1).

Numerous sera showed positive reactions with several serogroups of L. monocytogenes, but only one of the serogroups had higher titers than the others.

All the sera with faint positive reaction (4d, 4e, 5 and 7) showed a strong positive reaction with one of dominant serovars of 1a, 2, 3 and 4b. Similar reactions between these serogroups come not only from similarity between some antigens of serovars of L. monocytogenes, but also from cross antigenicity between L. monocytogenes and some species of bacteria such as micrococcus, Staphylococcus aureus, hemolytic streptococci, Escherichia coli K8, Staphylococcus epidermidis and corynebacterium. Many people carry these organisms throughout their lives (especially Staphylococcus aureus).

The results showed that the most dominant serovars of L. monocytogenes which cause listeriosis in Iran are 4b (85.4% of positive tests), 1a (78.1%), 3 (65.6%) and 2 (64.9%).

The obtained results from this investigation compare with Seeliger and Hohne (1979) who determined serogroups of 1, 3 and 4 of L. monocytogenes in the samples of human infections in U.K. Similar results were obtained by J. McLaughlin, et al. who confirmed the existence of serogroups 1, 3 and 4 in the 153 samples by phage typing method.

Gray and Killinger reported that the listeria serotypes identified in infants and children were types 1 and 4b which are types commonly encountered in the United States, but types 2 and 3 are rare. Type 4b comprises approximately two-thirds of all cultures. Ahlfors et al. isolated serotypes 1b, 4b and 1a in five patients.

So far type 1 is the predominant type in Europe, whereas in the mid-1960s, the dominant type was 4b.

ACKNOWLEDGEMENTS

We wish to thank Dr. R.Z. Mirdamadi for collecting the clinical samples; Dr. M. Mazaheri, Biotechnology Department of IROST, for help in preparing this manuscript; Dr. Babai, Tarbiet Modarres University, for statistical studies and Miss M. Hooshdaran, Medical University of Tehran, for her advice on the IF tests. Thanks are also due to Mr. M. Azin, Mrs. P. Samadi, Mrs. M. Tabatabaie and other colleagues at the Persian Type Culture Collection (PTCC) and Tarbiet Modarres University for economical and equipment support.

REFERENCES

1. Murray EGD, Webb RA, Swan MBR: A disease of rabbits characterized by large mononuclear leukocytosis, caused by a hitherto undescribed bacillus Bacterium monocytogenes (n.sp.).
S. Mirdamadi, MSc, et al.