|  |  |
| --- | --- |
| Logo AGES | |
| STEC | |
|  |  |
| 30.04.2025 08:05 Uhr | |

**STEC**

**Shigatoxin-producing
Escherichia
coli**

Last
change:
05.11.2024

**Profile**

Bacteria
of
the
species
*Escherichia*
(E.)
*coli*
are
part
of
the
normal
intestinal
flora
in
humans
and
animals.
If
they
acquire
the
ability
to
produce
a
specific
toxin,
shiga
toxin,
they
are
called
shiga
toxin-producing
*E.
coli*
(STEC)
after
this
toxin.
STEC
are
sensitive
to
heat
but
survive
in
frozen
foods
and
in
acidic
environments.
The
terms
verotoxin-forming
*E.
coli*
(VTEC)
and
enterohemorrhagic
*E.
coli*
(EHEC)
are
used
as
synonyms
for
STEC.
These
pathogenic
types
can
also
cause
fatal
diseases.

**Occurrence**

Worldwide.
Since
1982,
STEC
has
been
known
as
a
diarrheal
agent
and
cause
of
kidney
failure
called
hemolytic
uremic
syndrome
(HUS).

**Pathogen
reservoir**

Ruminants
(cattle,
sheep,
goats)
and
wild
animals
(deer
and
roe
deer)

**Infection
route**

Transmission
of
the
bacteria
occurs
mainly
through
the
consumption
of
contaminated
food,
such
as
raw
beef
mince,
Mettwurst,
salami,
raw
milk,
but
also
plant
foods
cultivated
on
fields
fertilized
with
cattle
manure
and
consumed
raw,
as
well
as
industrially
produced
sprouts.
Of
importance
are
transmissions
after
contact
with
ruminants
(petting
zoos),
if
no
appropriate
cleaning
of
the
hands
(hand
washing
with
soap)
is
carried
out
afterwards,
as
well
as
human-to-human
chains
of
infection,
which
is
to
be
observed
especially
in
community
facilities
(kindergartens,
old
people's
homes,
etc.).
It
is
assumed
that
50-100
STEC
germs
are
sufficient
to
cause
the
disease
in
healthy
people.

**Incubation
period**

Between
2
and
8
days,
mostly
3-4
days

**Symptomatology**

The
disease
usually
begins
with
watery
diarrhea,
which
often
becomes
bloody
after
a
few
days
and
may
be
accompanied
by
severe
nausea,
vomiting
and
abdominal
pain.
The
disease
is
predominantly
self-limiting
and
lasts
on
average
eight
to
ten
days.
In
about
5-10%
of
cases,
especially
in
young
children,
a
characteristic
secondary
disease,
the
life-threatening
hemolytic
uremic
syndrome
(HUS),
may
develop
days
after
the
onset
of
diarrhea.
The
toxin
binds
to
special
receptors
on
the
cell
walls
and
damages
blood
capillaries;
this
can
lead
to
kidney
failure
(lack
of
urine
formation),
anemia,
reduced
platelet
count,
skin
hemorrhages
and
neurological
changes.

Animals:
calf
diarrhea
may
occasionally
be
(co-)caused
by
STEC.
STEC
can
also
sporadically
cause
diarrhea
in
lambs,
goats,
dogs,
and
cats.
In
pigs,
a
subtype
of
STEC
causes
the
so-called
edema
disease.

**Therapy**

Treatment
with
antibiotics
is
generally
considered
contraindicated
because
the
bacteria
produce
increased
toxin
when
exposed
to
antibiotics,
which
can
increase
the
complication
rate.
Therapy
that
rebalances
the
water
and
electrolyte
balance
is
usually
sufficient.
In
severe
cases
(e.g.,
HUS),
intensive
medical
treatment
is
required,
such
as
blood
washing.

**Prevention**

Since
ruminants
and
wild
ruminants
are
considered
to
be
the
reservoir
of
these
bacteria,
strict
adherence
to
hygiene
regulations,
e.g.
washing
hands
after
animal
contact,
is
of
great
importance.
Persons
who
have
contracted
STEC
infections
must
not
be
employed
in
the
commercial
production,
handling
or
marketing
of
foodstuffs
until
a
decision
by
the
health
authority
indicates
that
they
are
no
longer
likely
to
spread
the
disease.
This
also
applies
mutatis
mutandis
to
employees
in
kitchens
of
restaurants,
canteens,
hospitals,
infant
and
children's
homes
and
in
communal
catering
areas.

**Situation
in
Austria**

**Human**

In
2023,
584
laboratory-confirmed
STEC
cases
were
reported
to
the
Epidemiological
Reporting
System
(EMS)
(EMS,
as
at
28.02.2024).
The
incidence
is
therefore
6.4/100,000
population.
The
increase
in
cases
since
2016
is
primarily
due
to
the
fact
that
laboratories
are
increasingly
using
culture-independent
detection
methods
and
therefore
more
patient
samples
are
also
being
analysed
for
STEC.
The
severe
complication
HUS
occurred
in
23
patients.

**VTEC
cases
in
Austria**

|  |  |  |
| --- | --- | --- |
| **Year** | **STEC-infections (incl. HUS-cases)** | **HUS-cases** |
| **2001** | 41 | 10 |
| **2002** | 42 | 12 |
| **2003** | 46 | 10 |
| **2004** | 43 | 10 |
| **2005** | 45 | 8 |
| **2006** | 56 | 5 |
| **2007** | 93 | 16 |
| **2008** | 103 | 17 |
| **2009** | 91 | 13 |
| **2020** | 88 | 11 |
| **2011** | 142 | 8 |
| **2012** | 146 | 18 |
| **2013** | 130 | 17 |
| **2014** | 131 | 14 |
| **2015** | 107 | 17 |
| **2016** | 177 | 14 |
| **2017** | 250 | 15 |
| **2018** | 300 | 8 |
| **2019** | 286 | 16 |
| **2020** | 304 | 11 |
| **2021** | 384 | 18 |
| **2022** | 469 | 12 |
| **2023** | 584 | 23 |

**Incidence
of
VTEC
disease
and
proportion
thereof
HUS
cases**

|  |  |  |
| --- | --- | --- |
| **Year** | **STEC-Infections Incidence** | **HUS Incidence** |
| **2001** | 0,51 | 0,12 |
| **2002** | 0,52 | 0,14 |
| **2003** | 0,56 | 0,12 |
| **2004** | 0,52 | 0,12 |
| **2005** | 0,54 | 0,09 |
| **2006** | 0,67 | 0,06 |
| **2007** | 1,12 | 0,19 |
| **2008** | 1,23 | 0,20 |
| **2009** | 1,08 | 0,15 |
| **2020** | 1,05 | 0,13 |
| **2011** | 1,68 | 0,09 |
| **2012** | 1,73 | 0,21 |
| **2013** | 1,53 | 0,20 |
| **2014** | 1,53 | 0,16 |
| **2015** | 1,24 | 0,19 |
| **2016** | 2,03 | 0,16 |
| **2017** | 2,84 | 0,17 |
| **2018** | 3,40 | 0,09 |
| **2019** | 3,22 | 0,18 |
| **2020** | 3,41 | 0,12 |
| **2021** | 4,30 | 0,20 |
| **2022** | 5,20 | 0,13 |
| **2023** | 6,40 | 0,25 |

**Foodborne
outbreaks**

In
2023,
five [foodborne
disease
outbreak
s(LMbKA](en/human/disease/foodborne-disease-outbreaks)
)
caused
by
STEC
were
reported
in
Austria.
Twelve
people
were
affected,
one
patient
was
hospitalised.
This
number
of
outbreaks
corresponds
to
the
long-term
average;
a
total
of
26
foodborne
outbreaks
caused
by
STEC
have
been
reported
in
the
past
10
years.

**Food**

In
2023,
approx.
1,000
food
samples
were
analysed
for
STEC,
mainly
meat
and
meat
preparations
(approx.
700
samples),
ready-to-eat
food
(approx.
60
samples)
and
milk
and
dairy
products
(approx.
220
samples).

STEC
were
detected
in
23
samples,
including
5
times
in
fresh
venison.

**Meat**:
STEC
were
found
in
14
of
197
raw
meat
samples
(different
animal
species,
including
game
meat),
whereby
these
pathogens
were
mainly
detected
in
meat
samples
from
wild
animals
(5
of
68
samples).
STEC
were
found
in
one
fresh
beef
sample
(n
=
68).

**Milk**:
STEC
were
detected
in
one
raw
cow's
milk
sample
and
one
cheese,
all
other
dairy
products
were
STEC-negative.

Seven
STEC
strains
were
isolated
from
**baking
mixes,
ready-made
dough
and
flour**
(n=123).

**Foodstuffs
examined
in
2023**

|  |  |  |
| --- | --- | --- |
| **Food category** | **N tests** | **N positive** |
| **Meat, fresh** | 197,00 | 14,00 |
| **Baking mixes, flour, ready-made doughs** | 123,00 | 7,00 |
| **Milk raw** | 50,00 | 1,00 |
| **Fruits, vegetables, ready-made salads** | 56,00 | 0,00 |

**Human
Medicine**

Based
on
their
antigen
structure,
*E.
coli*,
and
thus
also
STEC,
can
be
classified
into
different
serogroups
(O-like
surface
antigens
"without
puff").
The
most
important
STEC
serogroup
worldwide
is
O157.
Other
frequently
isolated
serogroups
are
O26,
O91,
O103,
O111,
and
O145.
More
and
more
serogroups
could
be
identified
in
association
with
human
STEC
diseases.

In
addition,
there
are
two
types
of
shigatoxins,
Stx1
and
Stx2.
The
shiga
toxin
(stx)
genes
can
be
further
subdivided
into
subtypes
(stx1a
to
stx1c
and
stx2a
to
stx2i).
Severe
disease,
especially
bloody
diarrhea
and
complications
such
as
HUS,
are
mainly
caused
by
stx2-positive
STEC
strains.

**Diagnostics**

Diagnosis
is
made
after
clinical
suspicion
at
the
**National
Reference
Center
for
*Escherichia
coli*,
including
verotoxin-producing
*E.
coli***
,
by
detection
of
a
verotoxin
gene
or
cultural
culturing
of
the
germs,
by
detection
of
verotoxin
in
stool,
or
(for
HUS
only)
by
detection
of
specific
antibodies
in
blood:

* Detection
  of
  enteroinvasive
  *E.
  coli*
  (EIEC),
  enteropathogenic
  E
  *.
  coli*
  (EPEC),
  enterotoxic
  E.
  coli
  (ETEC),
  enteroaggregative
  *E*.
  coli
  (EAggEC),
  and
  STEC
  in
  human
  stool
  specimens.
* Isolation
  and
  cultural
  detection
  of
  STEC
  from
  human
  stool,
  food,
  and
  environmental
  samples
  using
  selective
  nutrient
  media,
  immunomagnetic
  separation,
  slide
  agglutination,
  and
  PCR
* Confirmation
  and
  typing
  of
  submitted
  isolates
  using
  biochemical
  and
  molecular
  biology
  methods
* Serotyping
* Fine
  typing
  of
  STEC:
  typing
  of
  shigatoxin
  genes
  (PCR),
  subtyping
  of
  shigatoxin
  genes
  and
  typing
  of
  other
  virulence
  genes
  (whole
  genome
  sequencing)
* Identification
  of
  epidemiological
  correlations
  of
  different
  isolates
  using
  whole
  genome
  sequencing
  data
* Detection
  of
  specific
  antibodies
  in
  HUS
  in
  human
  serum
* Keeping
  a
  master
  collection
  of
  all
  human,
  veterinary,
  feed
  and
  food
  isolates
* Clarification
  of
  sources
  of
  infection
  and
  transmission
  routes
  in
  the
  context
  of
  outbreak
  investigations
* Consultation
  on
  questions
  of
  diagnostics,
  compulsory
  reporting,
  epidemiology,
  food
  safety,
  prevention
  and
  preventive
  measures.

**Veterinary
Medicine**

STEC
strains
that
express
F18ab
fimbriae
as
specific
virulence
factors
in
addition
to
Stx2e
(shiga
toxin
2e)
appear
as
pathogens
of
edema
disease
(colienterotoxemia).

After
weaning
of
piglets,
excessive
STEC
multiplication
in
the
small
intestine
may
be
favored
by
profound
changes
in
the
physiological
conditions
of
the
intestine.
Stx2e
leads
to
swelling
in
the
tissues
(edema)
due
to
vascular
damage,
typically
in
the
head
area
especially
on
the
eyelids
and
on
the
bridge
of
the
nose
and
also
in
the
nervous
tissue,
which
can
also
lead
to
central
nervous
phenomena
(disturbance
in
the
coordination
of
muscle
movements,
paralysis).
Treatment
of
clinically
ill
animals
is
often
no
longer
successful.
Great
importance
is
attached
to
metaphylaxis,
in
the
course
of
which
all
animals
of
the
affected
group
are
treated
non-specifically
(e.g.
feed
deprivation,
abundant
water
supply,
possibly
oral
or
parenteral
chemotherapy).
For
prevention,
[herd-specific
vaccines](en/animal/veterinary-medicines-hormones/herd-specific-vaccines)
can
be
administered.

**Contact**

**National
reference
center
for
Escherichia
coli
including
verotoxin-producing
E.
coli**

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