

# **Microbiologic Testing to Identify Shiga Toxin-Producing *E. coli* in HUS Patients**

**FoodNet 1997-2001**

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# Hemolytic Uremic Syndrome (HUS)

- **Life threatening illness**
  - Hemolytic anemia
  - Thrombocytopenia
  - Acute renal failure
- **Most cases in U.S. due to Shiga toxin-producing *E. coli* (STEC)**
  - Children
  - Post-diarrheal

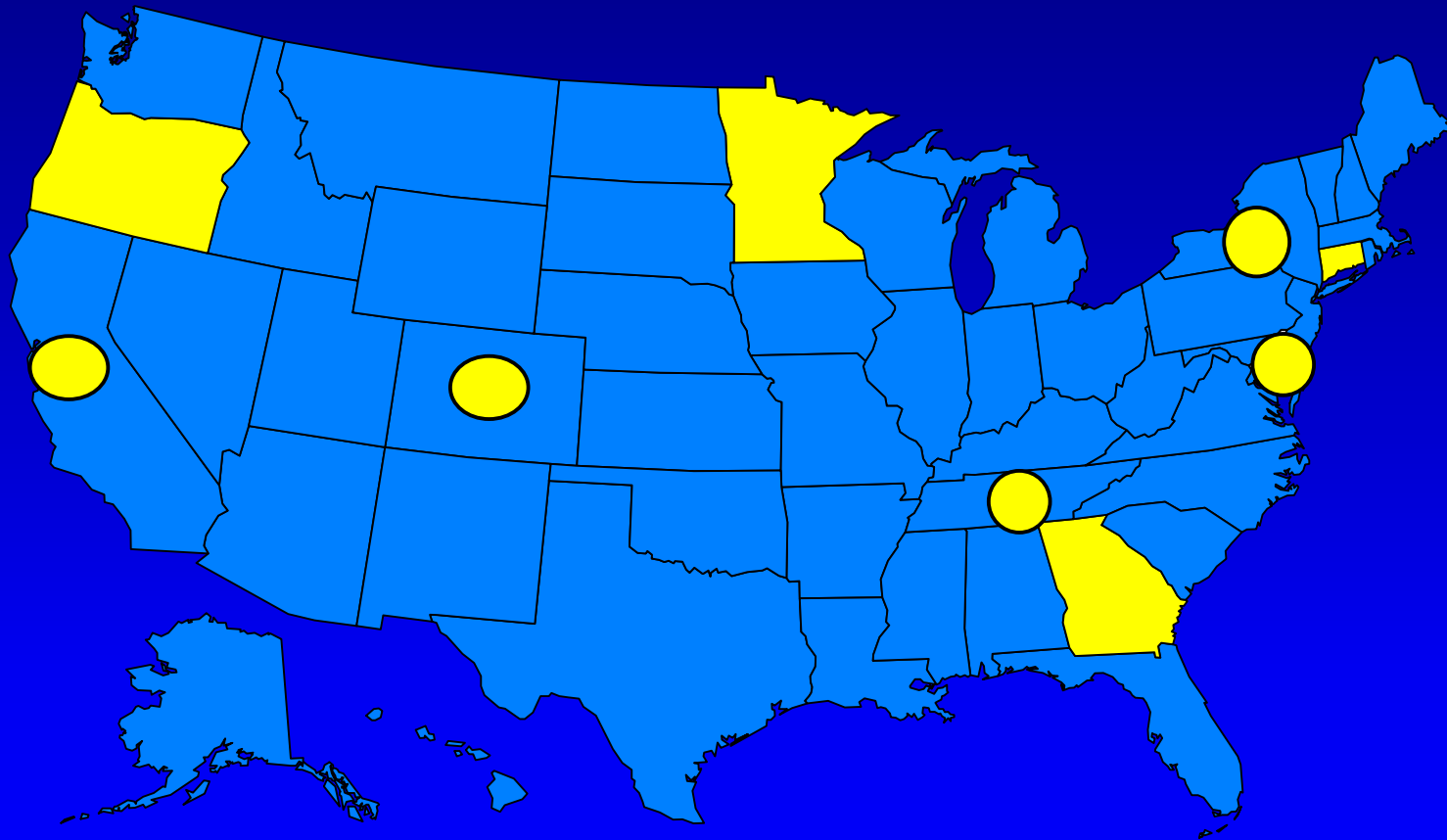
# STEC in HUS

- **Most commonly isolated STEC serotype is O157:H7, but many different STEC serotypes**
- **Surveillance for non-O157 STEC serotypes difficult due to laboratory methods required**
- **Unknown what proportion HUS cases are due to non-O157 serotypes**

# Testing for STEC

- *E. coli* O157:H7– clear pink colored colonies on sorbitol MacConkey agar (SMAC)
- Non-O157 STEC serotypes
  - Most look like normal *E. coli* on SMAC
  - EIA or PCR tests for Shiga toxin
  - Identify toxin-producing *E. coli* colonies
  - Serotype O and H antigen
- Human serology

# Foodborne Diseases Active Surveillance Network (FoodNet) [population 34.3 million]



# FoodNet HUS Surveillance

- **Pediatric nephrologists in catchment areas participated**
- **Participants routinely contacted to identify HUS cases**
- **Adult HUS cases reported in passive surveillance system**
- **Demographic, clinical and microbiologic data collected**

# STEC Testing in FoodNet Sites

- **Primary specimens tested as part of routine clinical evaluation at local facilities**
  - **HUS diagnosis may have been long after infection**
- **Specimens sent to state public health laboratory for testing if specimens or cultures collected and transferred in timely manner**

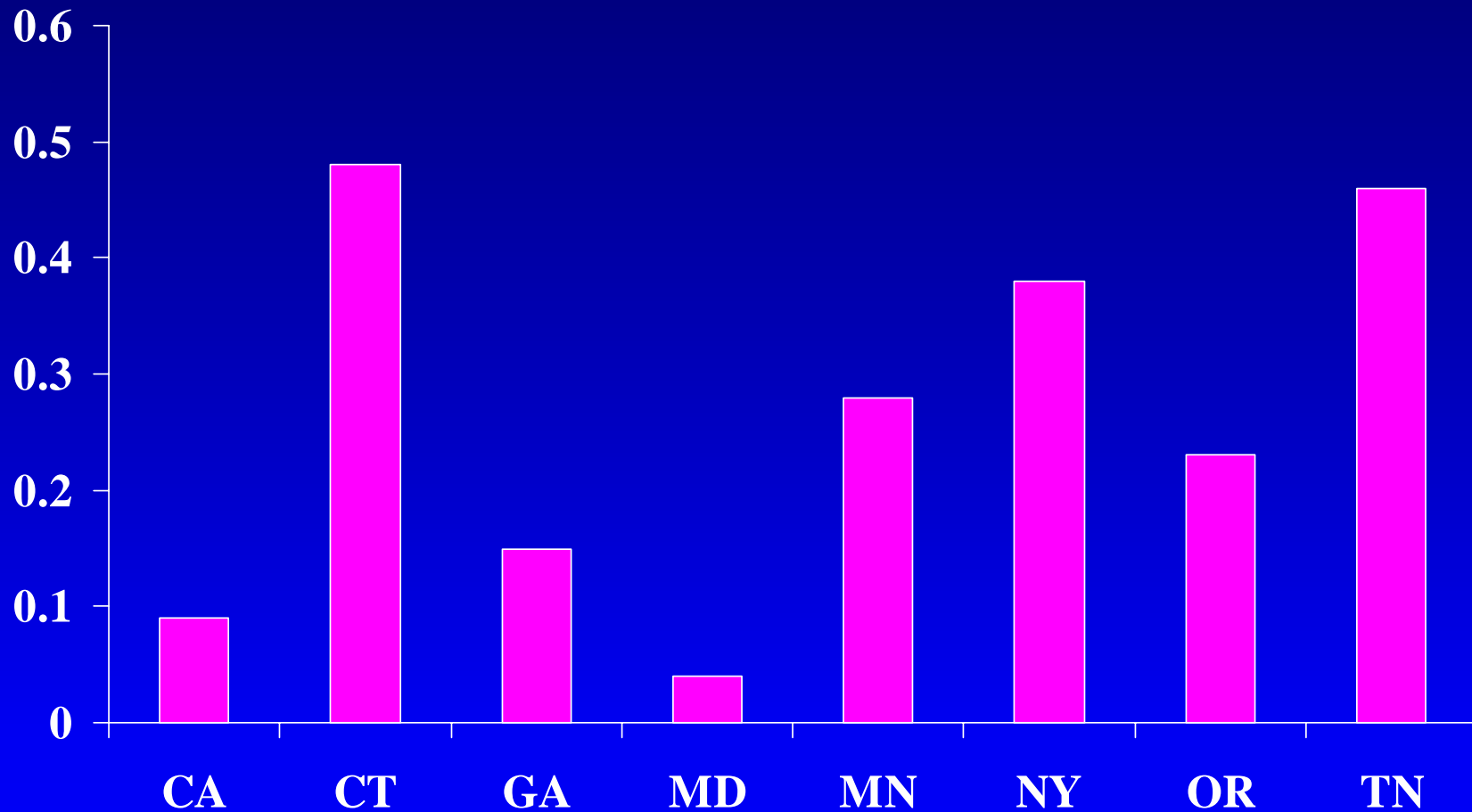
# HUS Cases 1997-2001

- **347 cases; 26 (8%) deaths**
- **94% post-diarrheal**
- **83% < 15 years old**
- **53% < 5 years old**



# HUS Incidence by FoodNet Site 2000

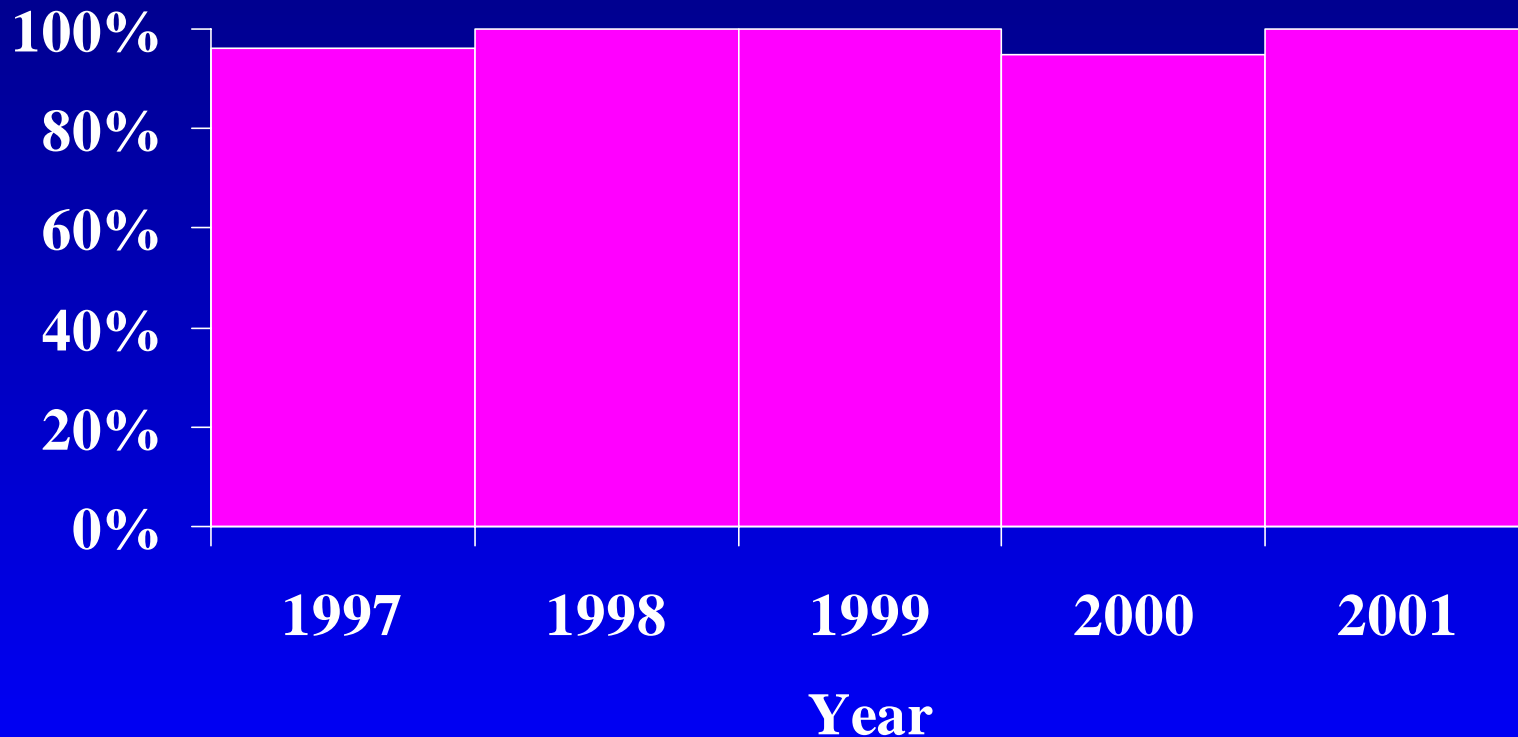
Incidence/100,000 pop.



FoodNet Site

# Patients with SMAC Culture (N= 347)

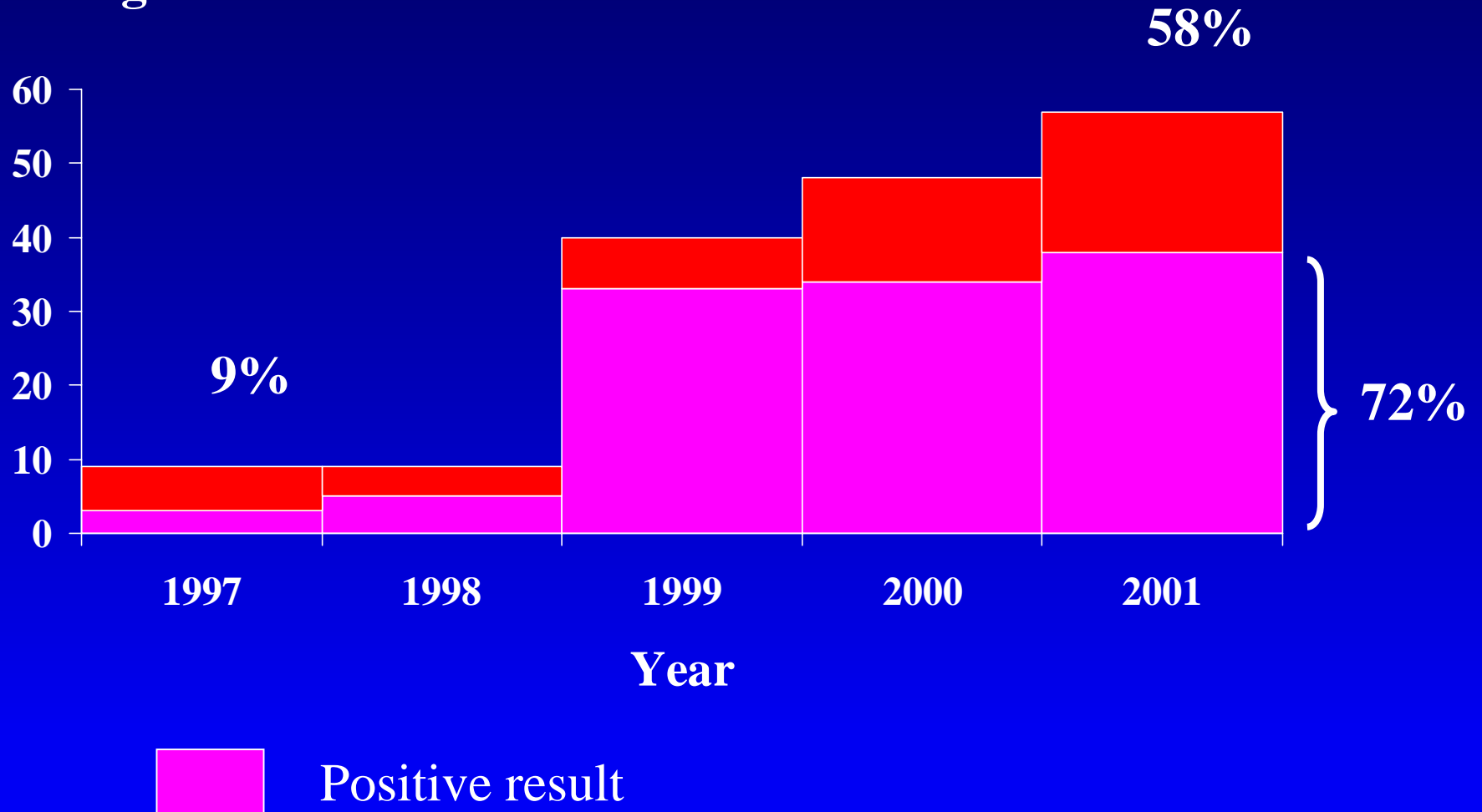
% SMAC culture



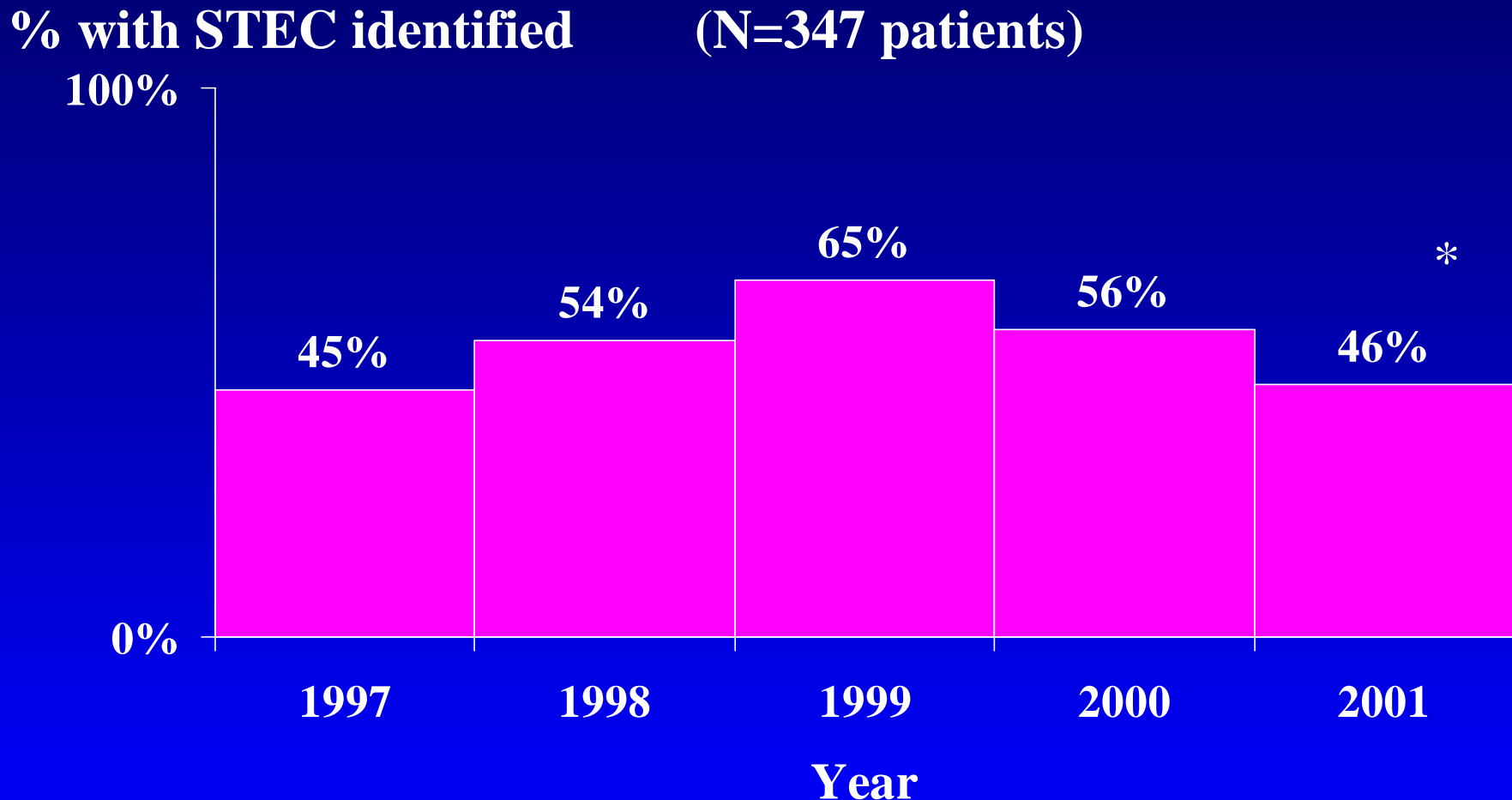
# Shiga Toxin Testing

(N= 347)

% with Shiga toxin test



# Shiga Toxin-Producing *E. coli* Isolated from HUS Patients



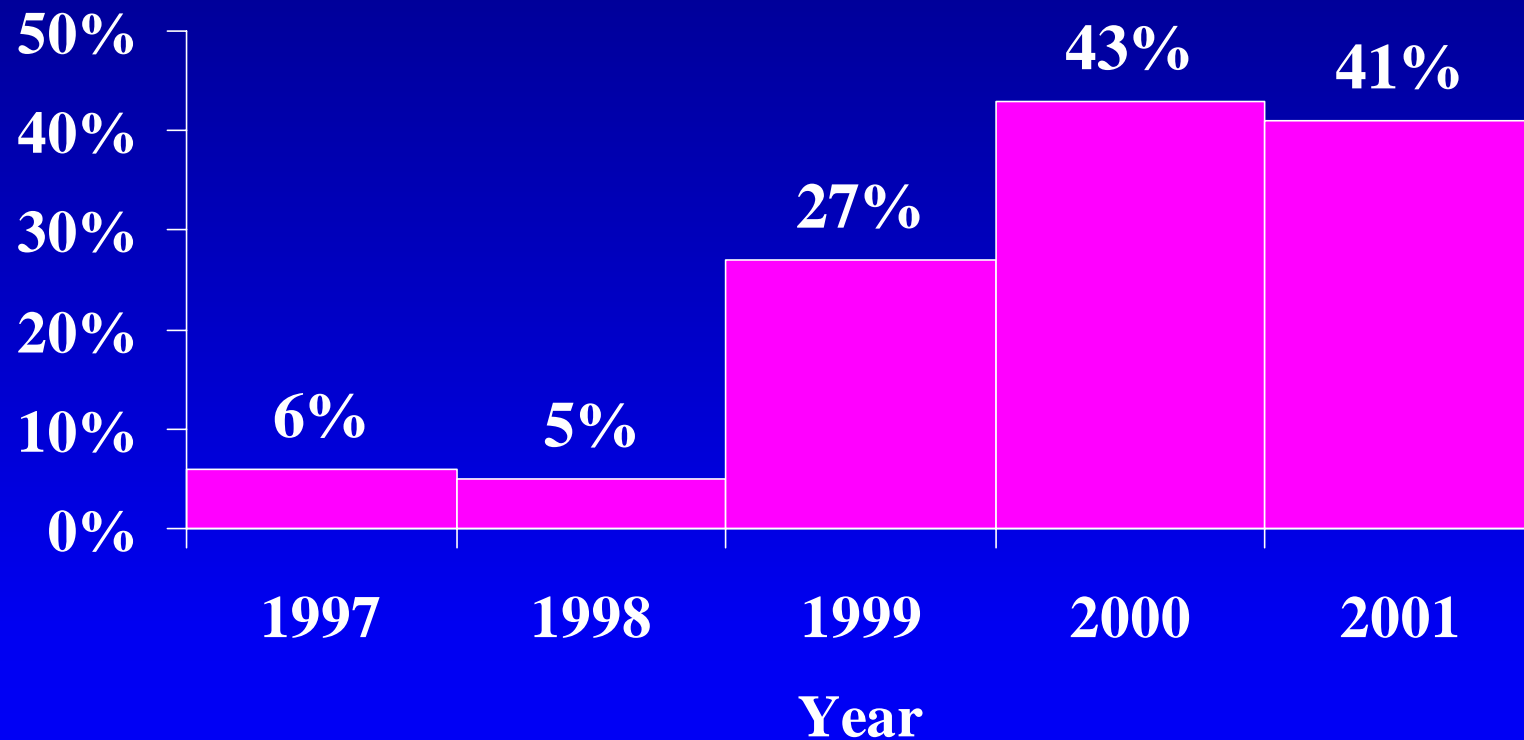
**Total STEC isolated 185      O157= 183      Non-O157= 2**

\* Preliminary data

# Shiga Toxin Testing

## Among O157 Culture-Negative Patients

% Shiga toxin tested



# **Patient Serologic Testing for O Group 157, 26 and 111 Antibodies**

- **28 serologic tests performed on STEC culture-negative patients**
  - **12 positive against O157 LPS**
    - **11 positive IgG**
    - **8 positive IgM**
  - **0 positive against O26 and O111 LPS**

# Conclusions

- **HUS is a rare disease with variable incidence by state**
- **Almost all patients had SMAC culture, but, of those culture-negative, only 41% had Shiga toxin test**
- **About one half of patients had STEC isolated, all but 2 were O157**
- **STEC testing was likely not comprehensive enough to determine the true rate of STEC infection, especially for non O157 serotypes**

# Conclusions

- **Increased efforts at complete microbiologic testing will aid in specific diagnosis and an improved understanding of STEC in HUS**
- **Serologic testing for antibodies against the major STEC serotypes helpful if microbiologic tests not done or negative**



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