

# West Nile virus (WNV) infection in blood donors: Colorado cohort study, 2003

Jennifer Brown, DVM, MPH  
Centers for Disease Control and Prevention  
Division of Vector-Borne Infectious Diseases  
Fort Collins, Colorado  
February 3, 2004



# 2003 Colorado WNV epidemic

- 2477 cases reported to ArboNET
  - 539 WNV neuroinvasive disease; 45 fatal
- Neuroinvasive disease incidence rate:
  - 122 cases/million population
- Estimated 80,850 persons infected
- Infection rate: 1.8%

# Bonfils Blood Center (BBC)

- Largest blood collection agency in Colorado
  - 200,000 units collected annually
  - Nine community donor centers
  - Over 115 healthcare facilities
- America's Blood Centers affiliate

# BBC WNV screening algorithm

**16-member  
minipool**

**Minipool NAT negative  
Release product**

**Minipool NAT reactive  
Test pool members  
individually**

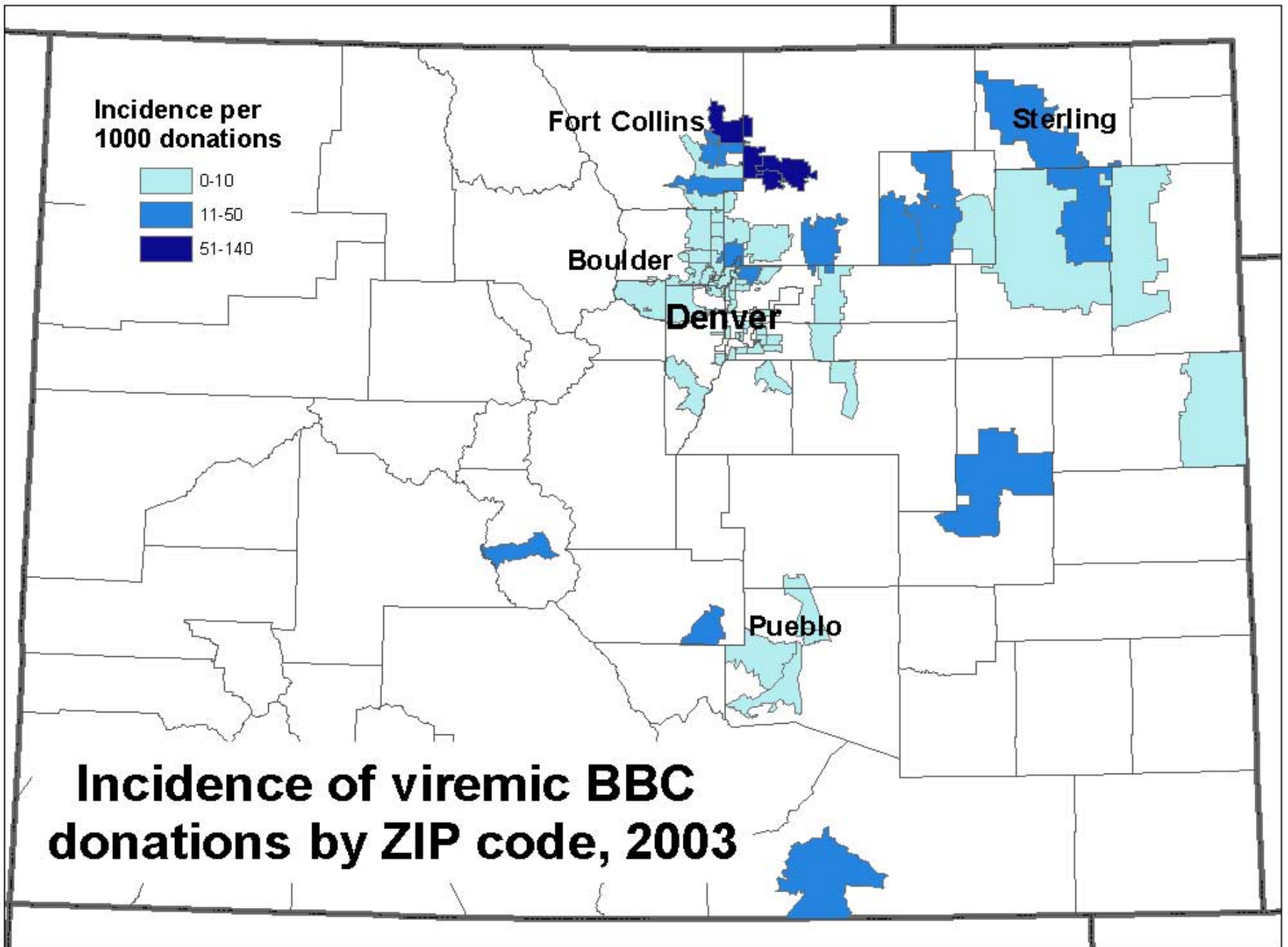
**Individual NAT negative  
Release product**

**Individual NAT reactive  
Withhold product**

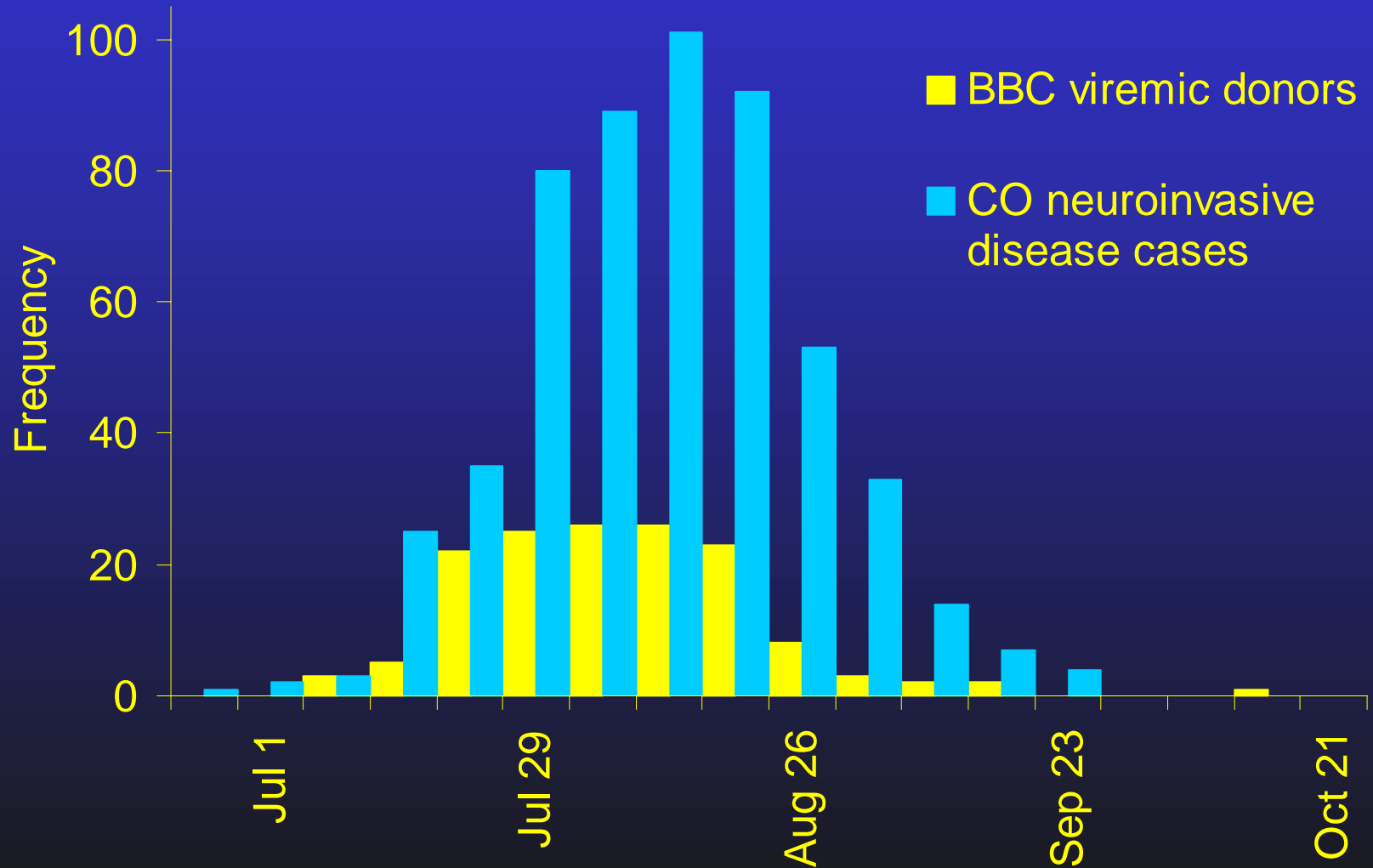
- Repeat individual NAT
- Additional testing: IgM and IgG ELISA, PCR
- Donor deferral
- Follow-up testing: NAT, PCR, IgM and IgG ELISA

# Case definition

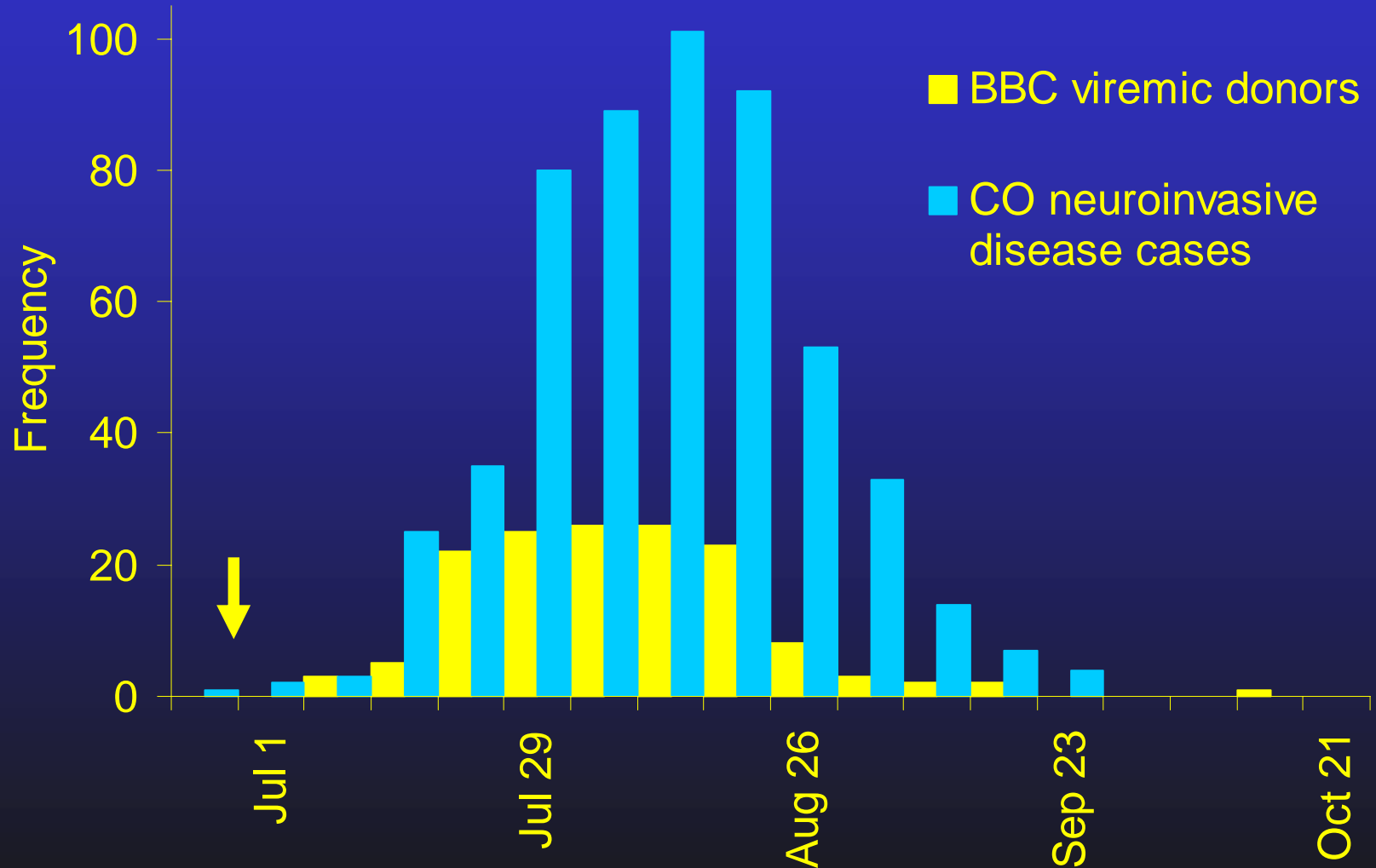
- Viremic donor:
  - At least one individual NAT reactive
  - WNV-specific IgM positive
- July 1 to October 31, 2003:
  - 72,928 donations tested
  - 165 minipools reactive
  - 168 individual donations reactive
  - 146 viremic donors
- Incidence: 0.2% (two in 1000 donations)



# 2003 epidemic curve



# 2003 epidemic curve





# Methods

- Donor records
  - WNV testing results
  - Demographic information
  - Brief history and physical exam
- Telephone surveys
  - Illness in 7 days before and after donation
  - Medical and vaccination history

# Phone surveys

- 168 individual donations NAT reactive
- 157 (93%) donors contacted
  - 152 completed interviews
  - 5 refused
- 11 (7%) donors not contacted
  - 1 no contact information
  - 2 less than 18 years
  - 8 unable to contact
- 132 of 146 (90%) viremic donors interviewed

# Age distribution of BBC donors, July 1 – October 31, 2003

---

	Viremic	Total	Percent
14-19	3	1627	0.18%
20-29	9	7533	0.12%
30-39	17	11796	0.14%
40-49	38	18334	0.21%
50-59	40	16486	0.24%
60-69	17	7626	0.22%
70-79	8	3081	0.26%
80-89	0	279	--
Over 90	0	9	--

---

# Gender distribution of BBC donors, July 1 – October 31, 2003

---

	Viremic donors	Total donors	Percent
Male	72	32615	0.22%
Female	60	34156	0.18%

---

# Race distribution among 132 viremic donors

---

	N	Percent
White, non-Hispanic	122	92%
Other	10	8%

---

# Preexisting conditions among 132 viremic donors

---

	N	Percent
High blood pressure	22	17%
Diabetes	8	6%
Heart disease	1	<1%
Previous seizures	2	2%
Previous meningitis	1	<1%
Previous encephalitis	0	--
Previous stroke	0	--

---

# Previous flavivirus exposure among 132 viremic donors

---

	N	Percent
<b>Infection</b>		
Dengue fever	1	<1%
West Nile virus	0	--
St. Louis encephalitis	0	--
Japanese encephalitis	0	--
<b>Immunization</b>		
Yellow fever	12	9%
Japanese encephalitis	0	--
Tick-borne encephalitis	0	--

---

# Case definition

- West Nile fever (WNF) case:
  - Viremic donor reporting fever AND headache in the week following donation
- 40 (30%) viremic donors were WNF cases
  - 12 (30%) of these visited a physician



# Other symptoms in WNF cases (N=40)

---

	N	Percent
Body aches	39	98%
Eye pain	25	63%
Skin rash	25	63%
Swollen lymph glands	19	48%
Nausea or vomiting	19	48%

---



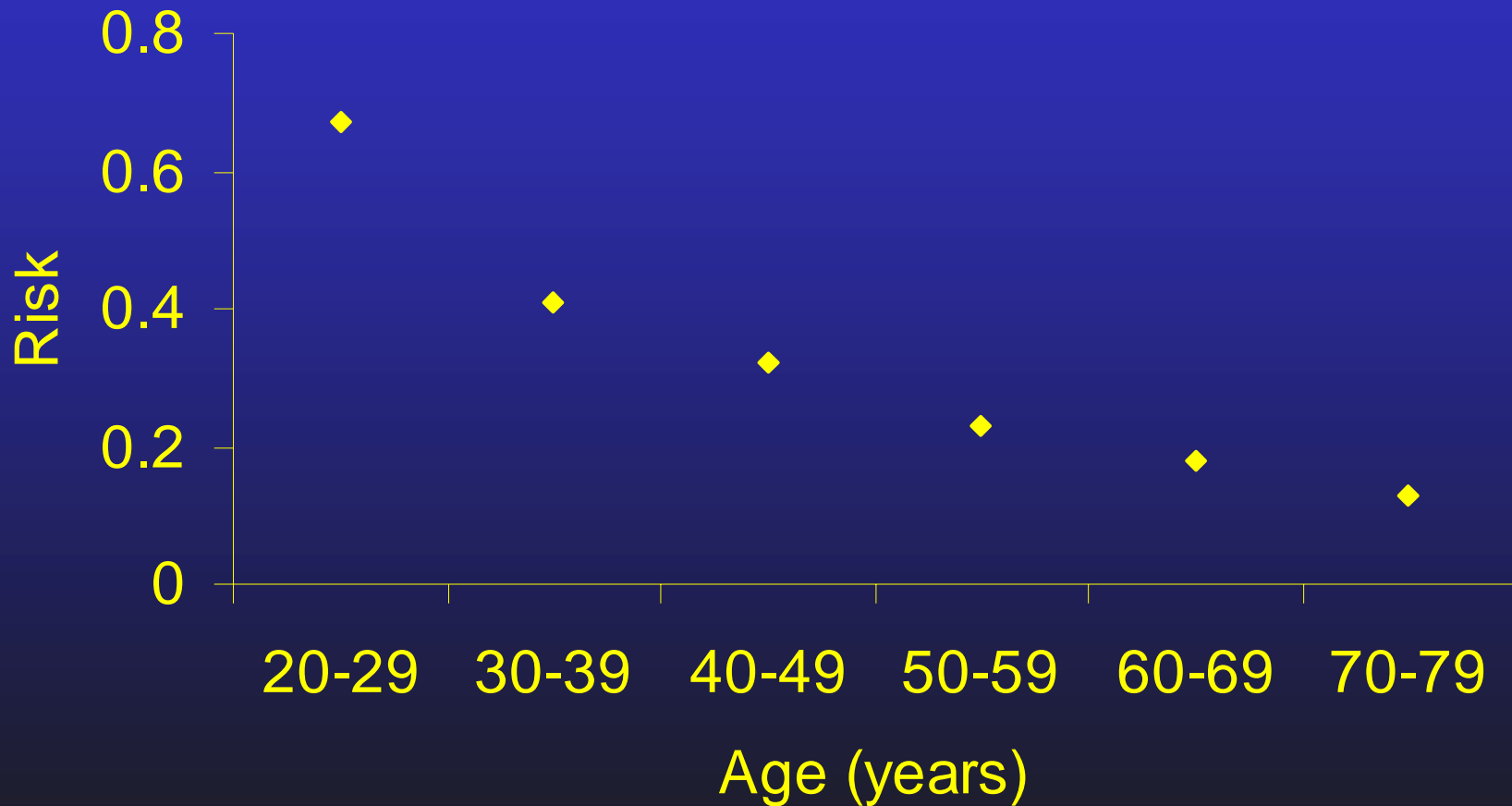
# Risk of WNF by age group

---

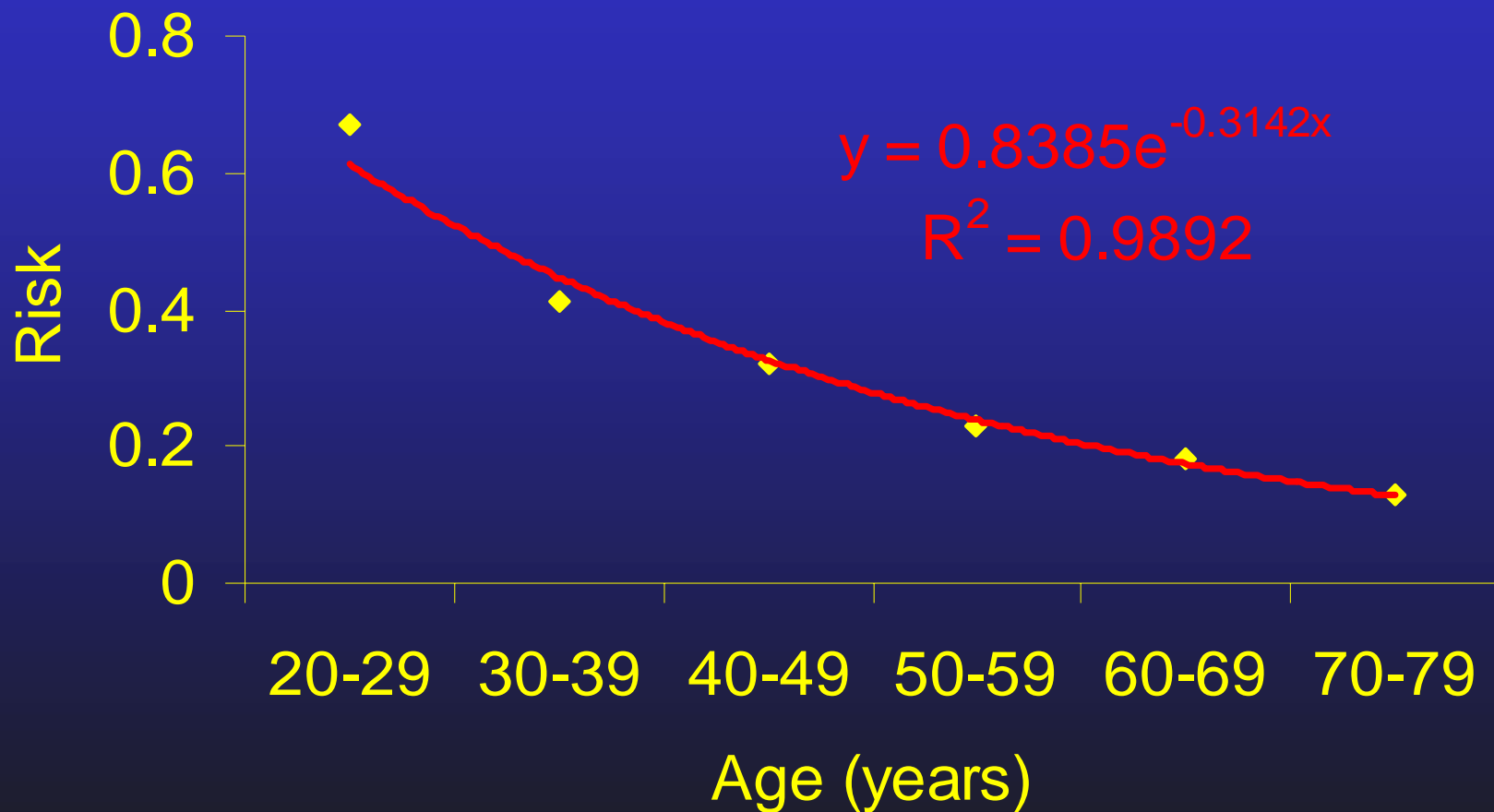
	WNF cases	Total	Risk
18-20	2	3	<b>0.67</b>
20-29	6	9	<b>0.67</b>
30-39	7	17	<b>0.41</b>
40-49	12	38	<b>0.32</b>
50-59	9	40	<b>0.23</b>
60-69	3	17	<b>0.18</b>
70-79	1	8	<b>0.13</b>
Total	40	132	

---

# Risk of WNF among viremic donors (N=129)



# Risk of WNF among viremic donors (N=129)



# Conclusions

- WNV most commonly identified blood-borne pathogen during 2003 CO WNV epidemic
- Viremic donations are important surveillance events
- WNF causes substantial morbidity in the general population
- WNF and WNV neuroinvasive disease may have different pathophysiologies

# Acknowledgements

- BBC

- Dan Ambruso
- Mike Bauer
- Bill Dickey
- Dawn Factor
- Pam Gould
- Nina Tkachenko

- Colorado DPHE

- John Pape

- CDC

- Roy Campbell
- Peggy Collins
- Nick Crall
- Ned Hayes
- John Jones
- Krista Kniss
- Stephanie Kuhn
- Jenn Lehman
- Tony Marfin
- Sue Montgomery
- Dan O’Leary