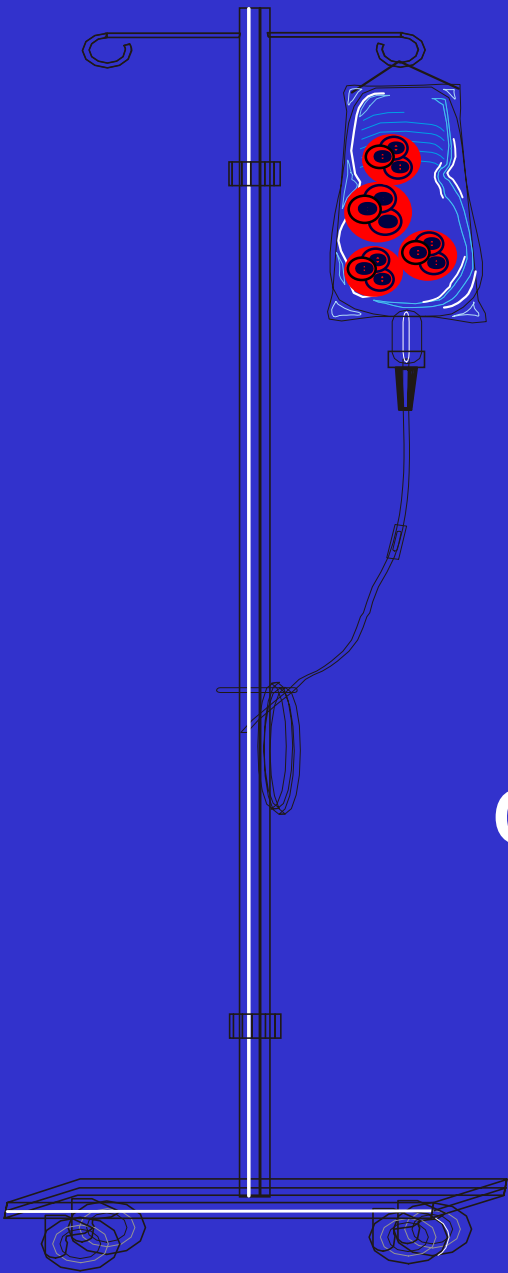


# Transfusion-Transmitted Malaria in the United States: Focus on FFP

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# Transfusion-Transmitted Malaria

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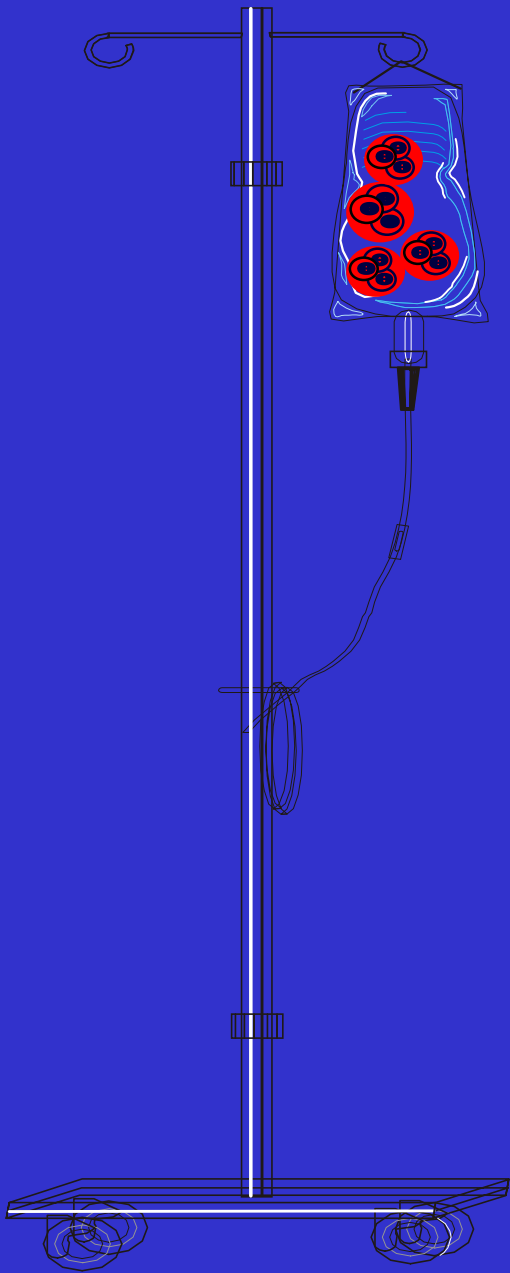
- Background
- Epidemiology in the United States, as relevant to FFP
- Lookback at outcome of recipients of FFP from known malaria-infected donors
- Medical literature



# Malaria

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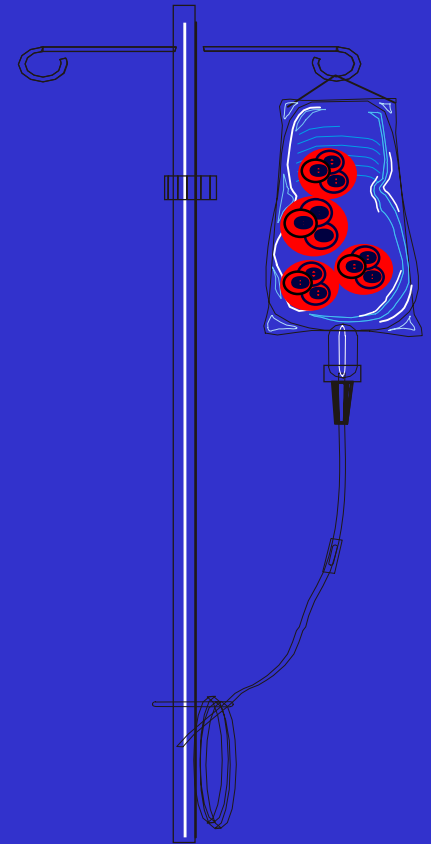
- Protozoan parasitic disease
- Caused by 1 of 4 species of *Plasmodium*:
  - *P. falciparum*, *P. vivax*,  
*P. malariae*, *P. ovale*
- Transmitted by bite of infected female anopheline mosquito



# Malaria in the United States

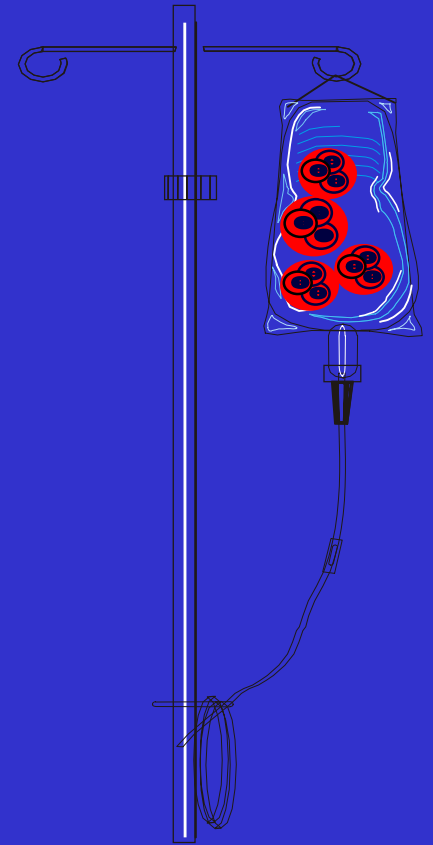
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- Eradicated in late 1940s
- Approximately 1,000 - 1,400 cases reported annually
  - Almost all imported
  - US travelers or foreigners
- Each year a few cases (<10) are transmitted within US
  - Transfusion or organ transplantation
  - Congenitally acquired
  - Local mosquito-borne transmission

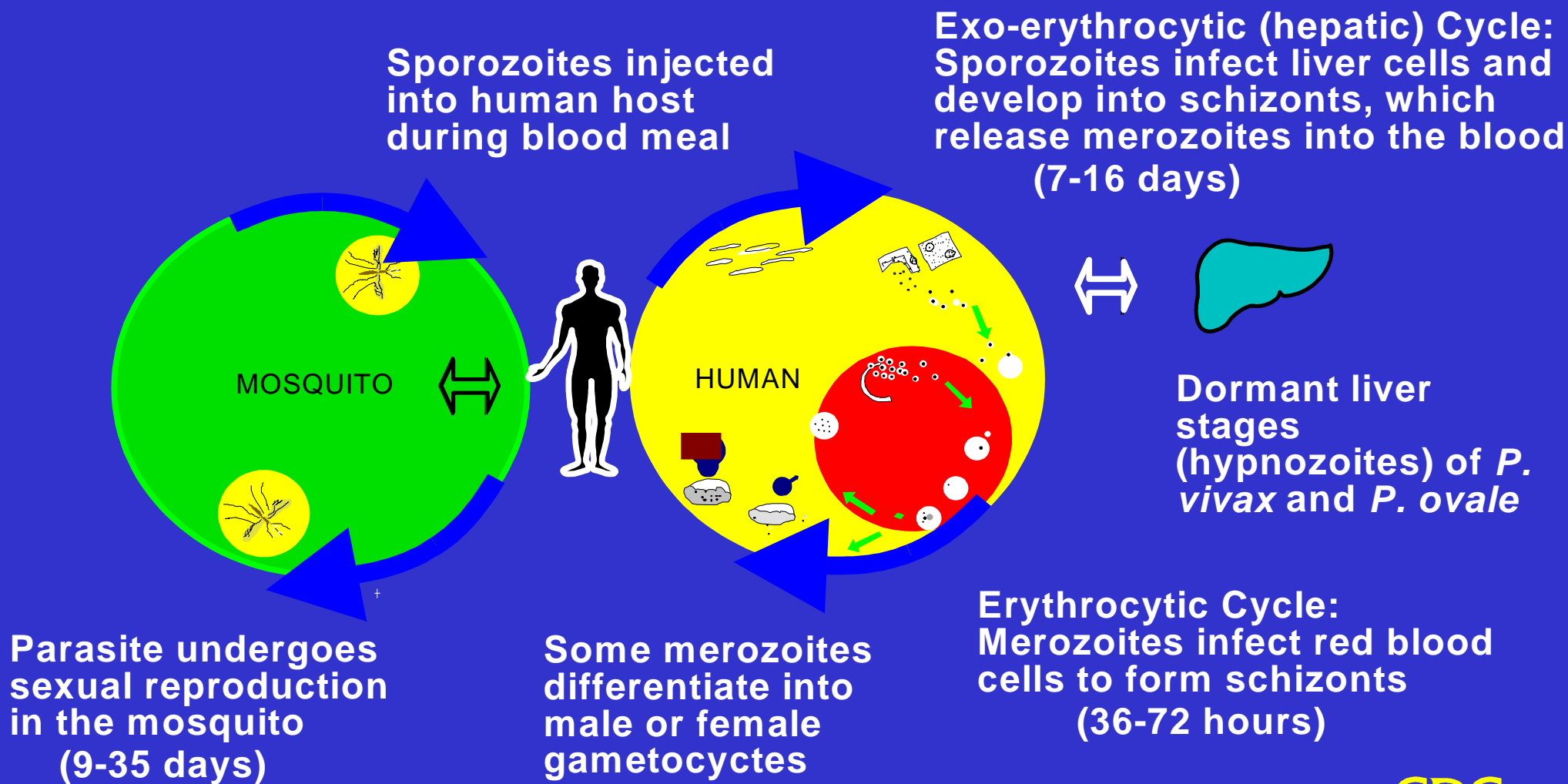


# Imported Malaria

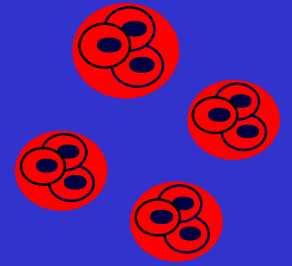
- Approximately half of cases - immigrants, refugees, residents of malarious countries who come to US
- Half in US travelers - civilians and military
- Major risk factor is failure to use effective chemoprophylaxis
  - 85% of cases use no or ineffective prophylaxis



# Malaria Transmission Cycle



# Malaria Species



## No persistent liver stage (non-relapsing)

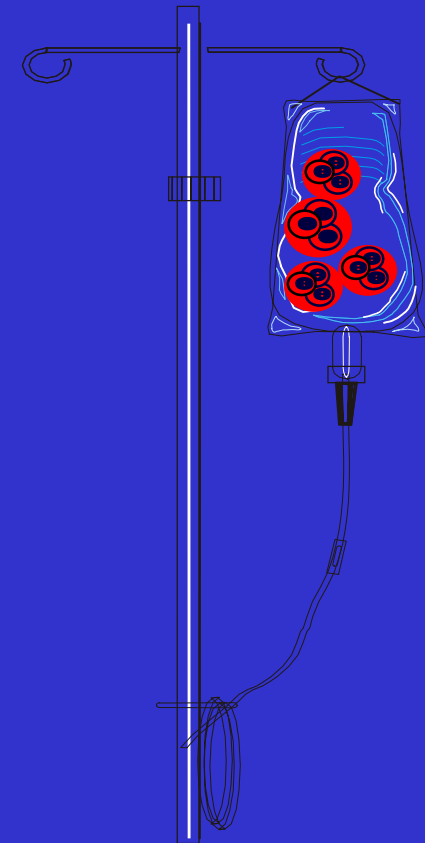
- **P. malariae** - can persist at low levels in blood for years to decades
- **P. falciparum** - rarely persists beyond 1-2 years
  - Responsible for most deaths due to malaria

## Persistent liver stage (relapsing) - rarely last beyond 3 years

- **P. vivax**
- **P. ovale**

# Transfusion-Transmitted Malaria

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- Rare in the US
  - Estimated incidence:  
1 case/ 4 million units collected
- High case fatality rate
- 3 complicated *Plasmodium falciparum* infections reported during 1996-1998



# Transfusion-Transmitted Malaria in the United States, 1963-1999

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- 93 reported cases
- Implicated blood component (n = 70)
  - Whole blood 63%
  - Packed RBCs 31%
  - Platelets 6%
- 67 implicated donors
- No change in incidence in last 15 years

# What about “unsolved cases”?

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- Any suggestion FFP could have been the infective blood product?
- Case-patient got FFP in 10 of 92 cases where data were available
  - In 6 cases, an implicated donor was found
    - In 5 of those 6, whole blood or PRBCs
    - In 1 of those cases, implicated product not mentioned in records (patient got PRBCs, platelets and plasma)

# What about “unsolved cases”?

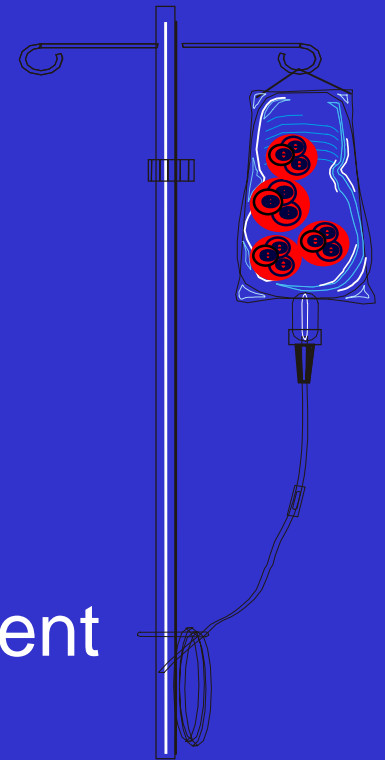
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- What about the other 4 cases?
  - 1 case – PRBCs/FFP – both RBC donors serologically neg but had traveled (unknown where); couldn't track FFP donors
  - 1 case – PRBCs/ WB/FFP – all donors neg but 1 donor had traveled to Ghana – unknown which component he donated
  - 2 cases – incomplete investigation - couldn't even track the whole blood donors
- **Bottom line:** no cases where evidence for transmission from other components definitively ruled out

# Lookback: Recipients of FFP from Malaria-Infected Donors, 1990-2000

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- 14 cases (one investigation still in progress)
- Of the 13 remaining cases:
  - No FFP transfused = 4
  - FFP transfused – no evidence subsequent malaria = 3
  - Investigation pending = 6



# Evidence in the Medical Literature Related to Risk from FFP?

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- Bruce-Chwatt\*
  - Reports to WHO from 1911-1972
  - 2001 reported cases without mention of infection associated with FFP transfusion



\* Bruce-Chwatt LJ. Transfusion malaria. Bull World Hlth Organ 1974;50:337-46.

# Evidence in the Medical Literature Related to Risk from FFP?

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- Lozner & Newhouser, 1943\* - transfused plasma from patients with malaria into 35 recipients
  - No transmission from frozen (n=20) or dried (n=3) plasma
  - Liquid plasma – transmission from plasma stored 1 day (2 of 2), ? in that stored for 1 week (1 of 5), and none stored for 2 weeks (n=5)

\*Lozner EI, Newhouser LR. Studies on the transmissibility of malaria by plasma transfusions. Am J Med Sci 1943;206:141-46.