

# **The Epidemiology of Venous Thromboembolism: Implications for Prevention and Management**

**John A. Heit, MD**

**Professor of Medicine**

**Director, Coagulation Laboratories &  
Coagulation Clinic**

**Consultant, Cardiovascular Diseases and  
Hematology Research**

**Mayo Clinic College of Medicine  
Rochester, MN**



# Annual Incidence of VTE in Olmsted County, MN: 1966–1995

Age- and Sex-Adjusted Incidence per 100,000\*

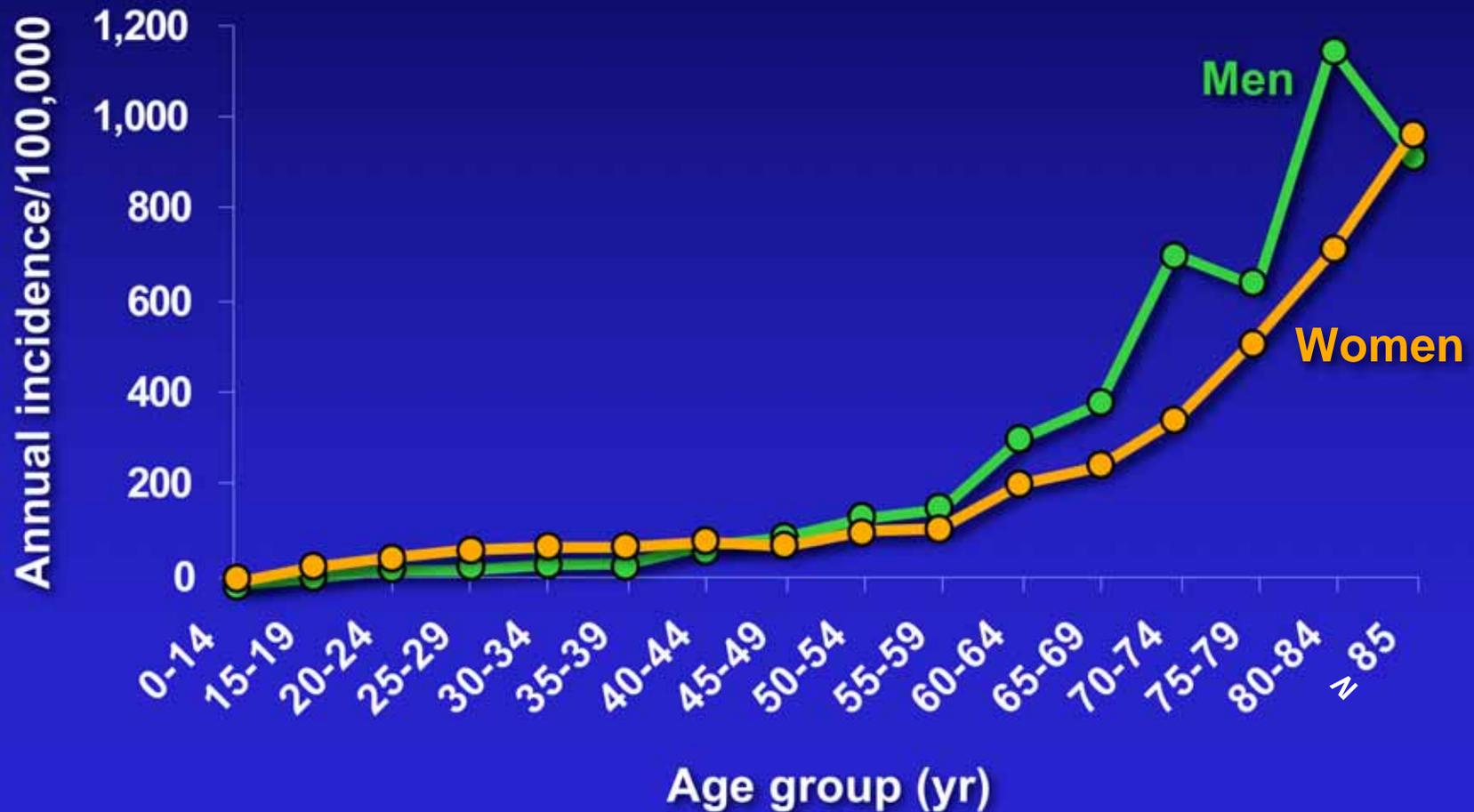
	Annual incidence/ 100,000	95% CI
Overall	126	121.2, 130.8

- Adjusted to the 1990 US white population.

Silverstein, et al. Arch Inter Med 1998; 158:585-93. Copyright © 1998, American Medical Association. All right reserved.

Heit, et al. J Thromb Haemost 2005

# Annual Incidence of VTE in Olmsted County, MN: 1966-1995 By Age and Gender



# VTE Incidence by Continent of Origin or Ethnicity

Continent of Origin or Ethnicity	Incidence ( $\pm$ SD) per 100,000
African-American*	138 $\pm$ 6.5
White*	103 $\pm$ 2.1
Hispanic*	61 $\pm$ 2.8
Asian-American/Pacific Islander*	29 $\pm$ 2.4
Native-American†	33

\*White RH, et al. Thromb Haemost 2005

†Hooper WC, et al. Thromb Res 2003.

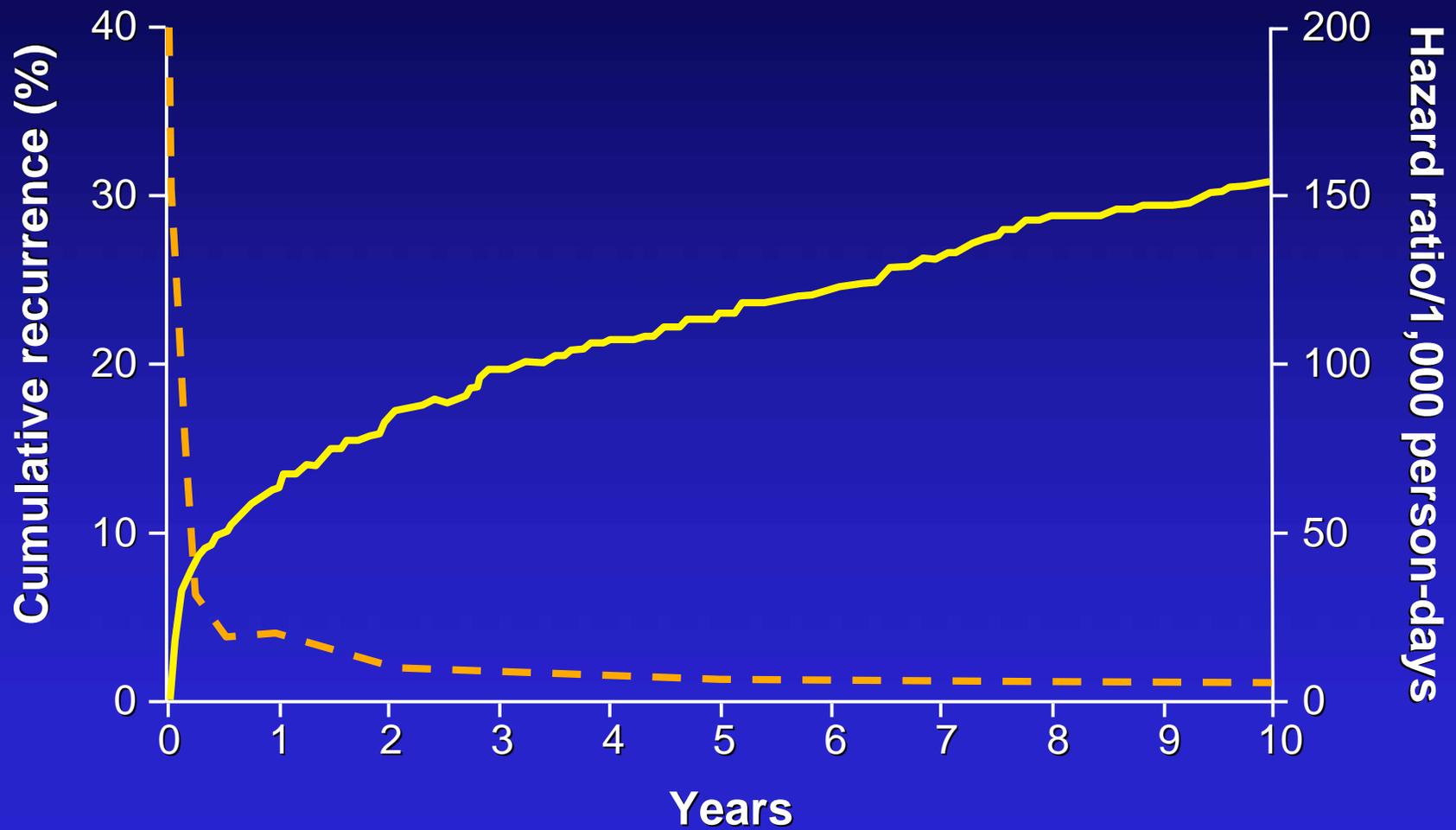
# Annual Number of Incident VTE in U.S.

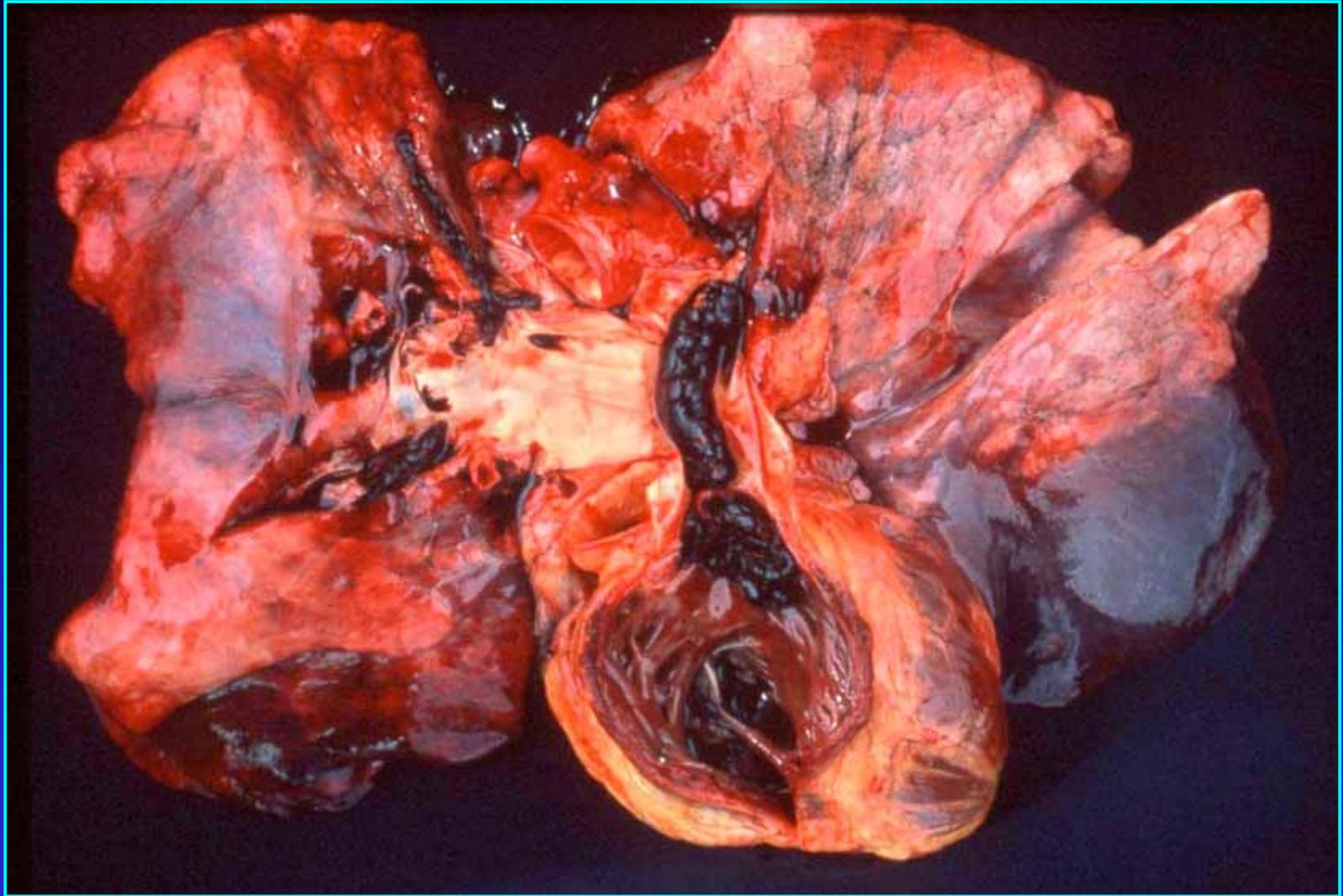
$\lambda$  White Americans 275,000\*

$\lambda$  African-Americans 29,000\*\*

Using the age- and sex-adjusted 1991-1998 incidence, adjusted to year 2000 U.S. White\* and African-American\*\* populations, respectively.

# Cumulative Recurrence of VTE





# Survival after VTE

<b>Time</b>	<b>Deep Vein Thrombosis Alone</b>	<b>Pulmonary Embolism</b>
<b>0 days</b>	<b>97.0</b>	<b>76.5</b>
<b>7 days</b>	<b>96.2</b>	<b>71.1</b>
<b>14 days</b>	<b>95.7</b>	<b>68.7</b>
<b>30 days</b>	<b>94.5</b>	<b>66.8</b>
<b>90 days</b>	<b>91.9</b>	<b>62.8</b>
<b>1 year</b>	<b>85.4</b>	<b>57.4</b>

# Total US 2002 VTE Events

## Incident & Recurrent, Fatal & Non-Fatal

Event	Community-acquired	Hospital-acquired	Total
<b><u>Non-fatal VTE</u></b>	<b>193,598</b>	<b>419,825</b>	<b>613,423</b>
DVT	108,240	268,125	376,365
PE	85,358	151,700	237,058
<b><u>Fatal VTE</u></b>	<b>106,551</b>	<b>189,819</b>	<b>296,370</b>
DVT	649	1609	2258
PE	105,902	188,210	294,112
<b>Grand Total</b>	<b>300,149</b>	<b>609,644</b>	<b>909,793</b>

\*Events occurring with 90 days after hospitalization were categorized as hospital-acquired.

# Total US 2002 VTE Events

## Total VTE exceed:

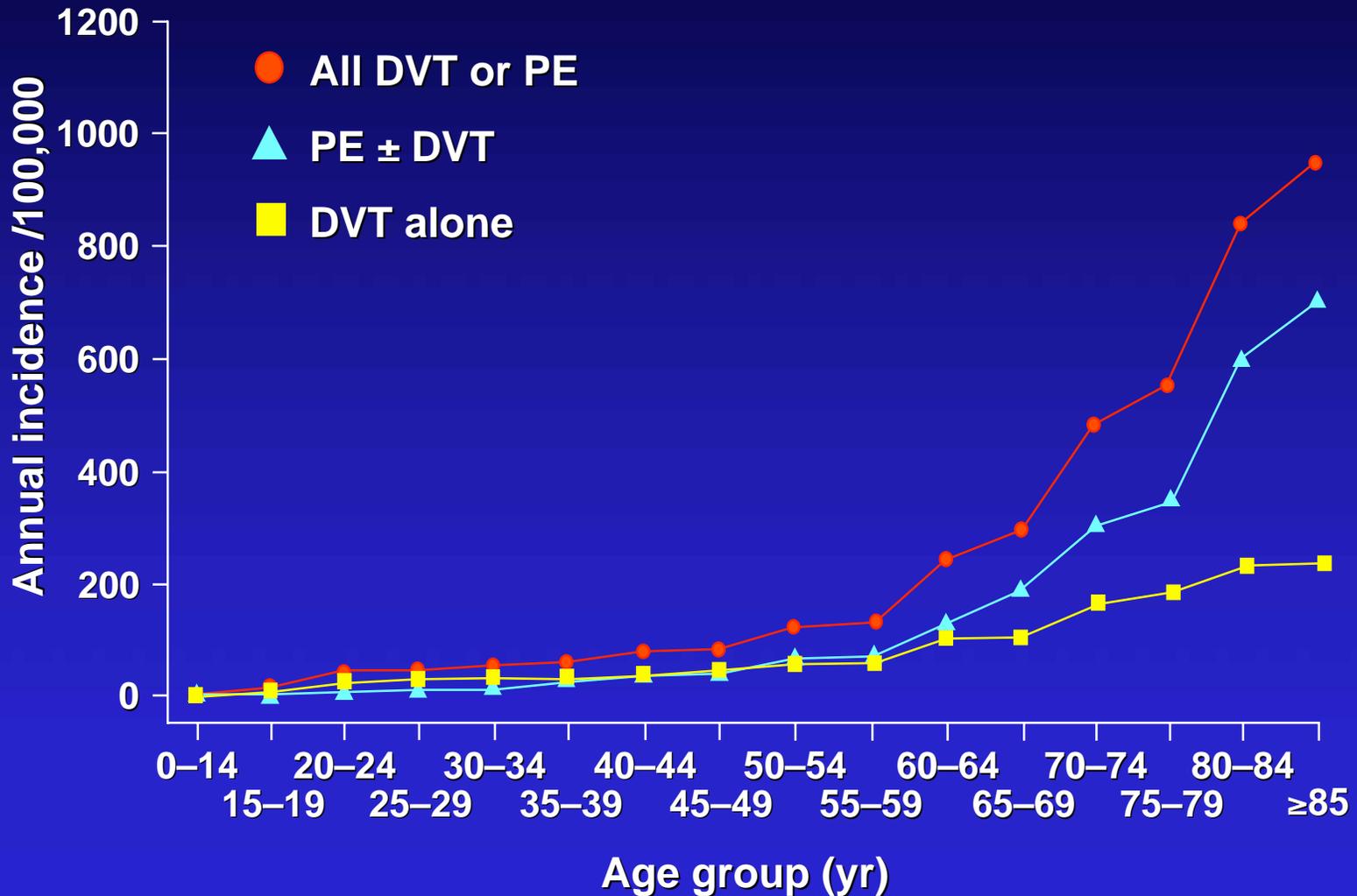
- $\lambda$  total myocardial infarctions per year (n=865,000).\*
- $\lambda$  total strokes per year (n=700,000).\*

## VTE-related deaths exceed:

- $\lambda$  myocardial infarction-related deaths per year (n=171,000; 2003).\*
- $\lambda$  stroke-related deaths per year (n=158,000; 2003).\*

\*Data obtained from 2006 AHA “statistics” table

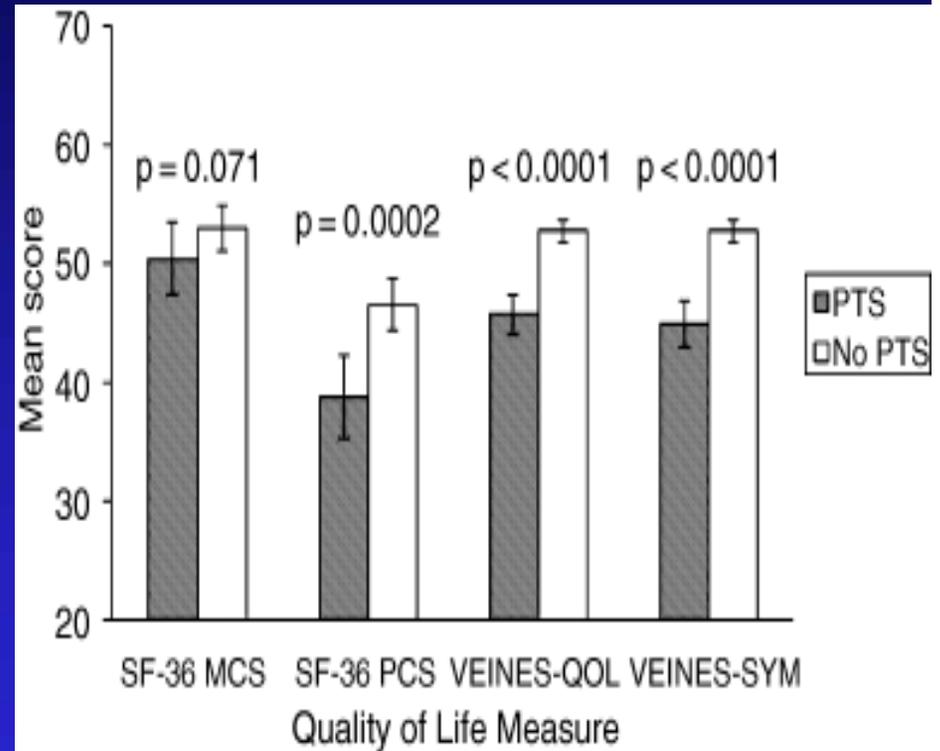
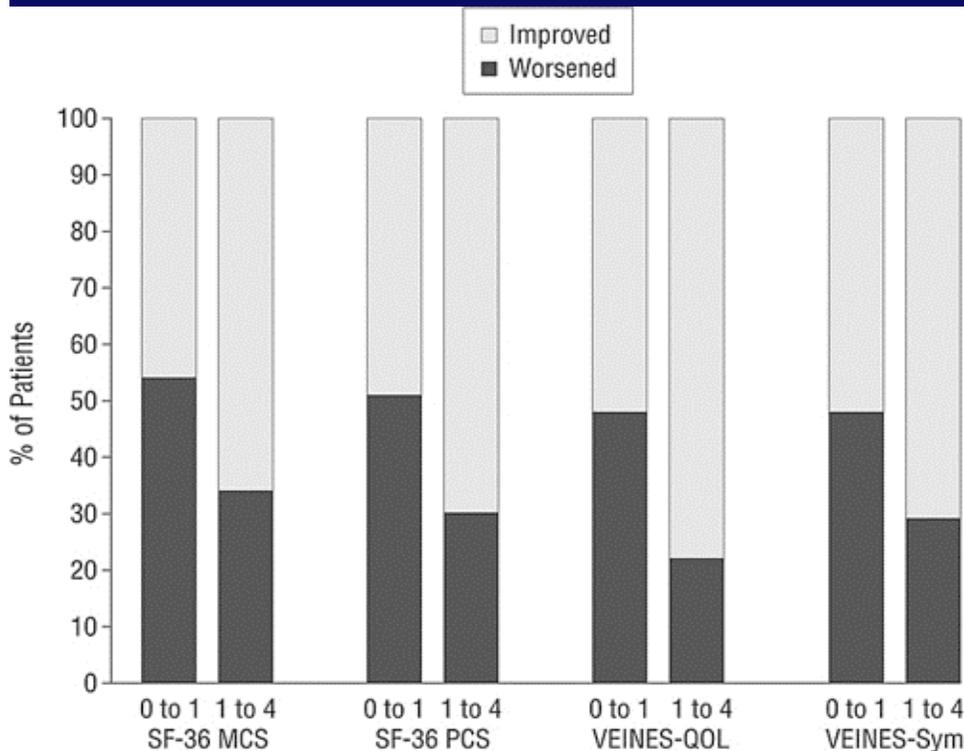
# Annual Incidence of VTE by Event Type (PE vs. DVT)





# Quality of Life after VTE

## Effect of Post-Thrombotic Syndrome



Kahn SR, et al. Arch Intern Med 2005; 165:1173-78, Copyright © 2005, American Medical Association, All rights reserved.

Kahn SR, et al. J Thromb Haemost 2004

# **Venous Thromboembolism Complications: Total US 2002 Incident & Prevalent Venous Stasis Syndrome and Chronic Thromboembolic Pulmonary Hypertension**

<b>Event</b>	<b>Community-acquired</b>	<b>Hospital-acquired</b>	<b>Total</b>
<b><u>Complication</u></b>			
<b>VSS*</b>	<b>93,613</b>	<b>242,840</b>	<b>395,673</b>
<b>CTEPH</b>	<b>1207</b>	<b>2103</b>	<b>4135</b>

**\*Includes both incident and prevalent venous stasis syndrome due to DVT.**

# Trends in VTE Incidence

- $\lambda$  1991-1997: 117.7 per 100,000 person-years
- $\lambda$  1981-1990: 116.0 per 100,000 person-years

# **Epidemiology of VTE in the Community**

## **Implications for Prevention of VTE**

- **VTE is common, potentially lethal and often presents as sudden death.**
- **VTE recurs frequently and causes long-term complications that reduce quality of life.**
- **VTE incidence unchanged from 1980-1999.**
- **As US average population age increases, number of VTE events and related deaths per year will increase.**