

Hepatitis C virus infection: monitoring of end-stage liver disease and prediction of disease burden

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VHPB meeting, 17-18th November 2005

Outline

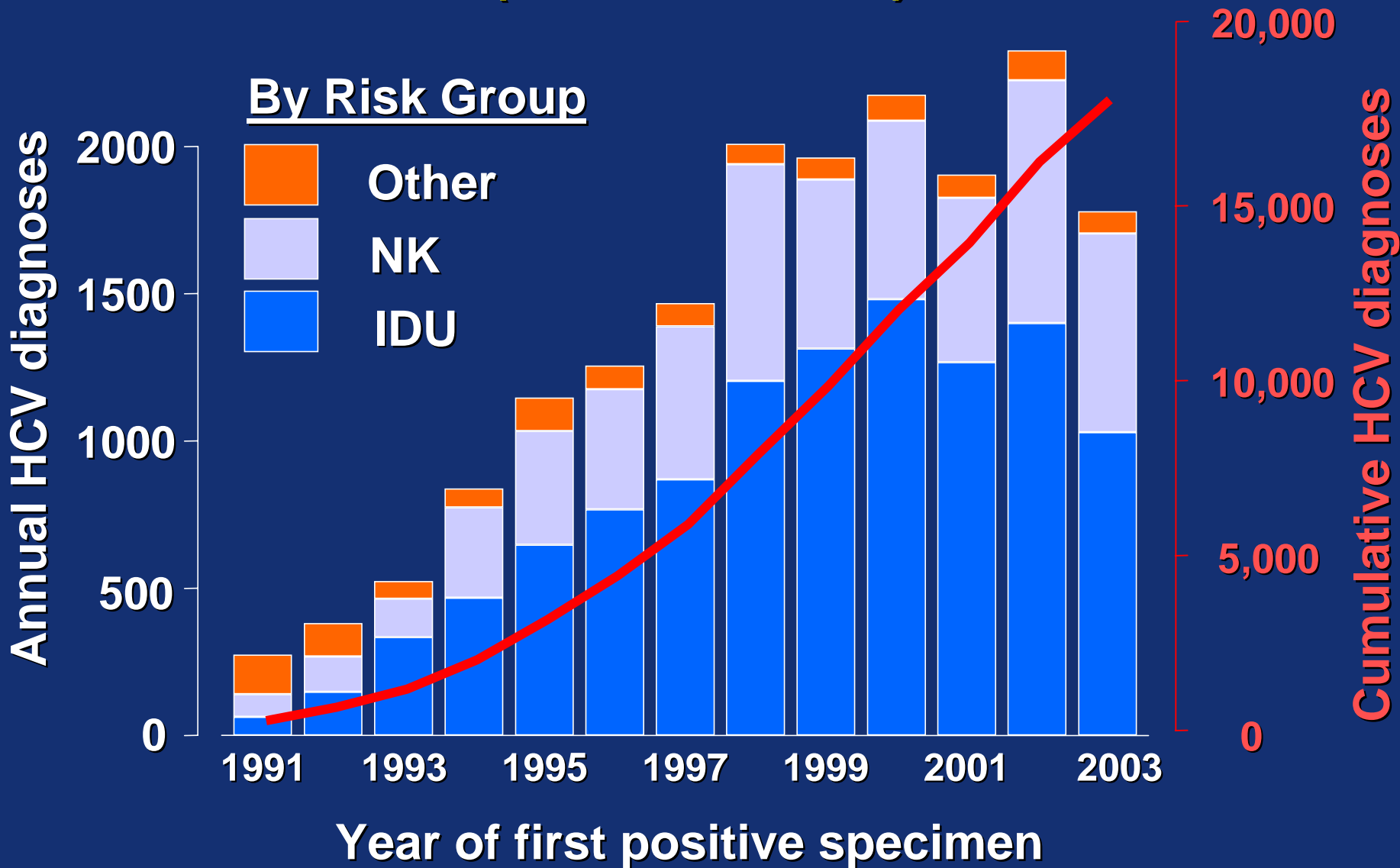
- **Monitoring of end-stage liver disease**
 - Scotland

- **Prediction of HCV disease burden**
 - Scotland
 - England and Wales

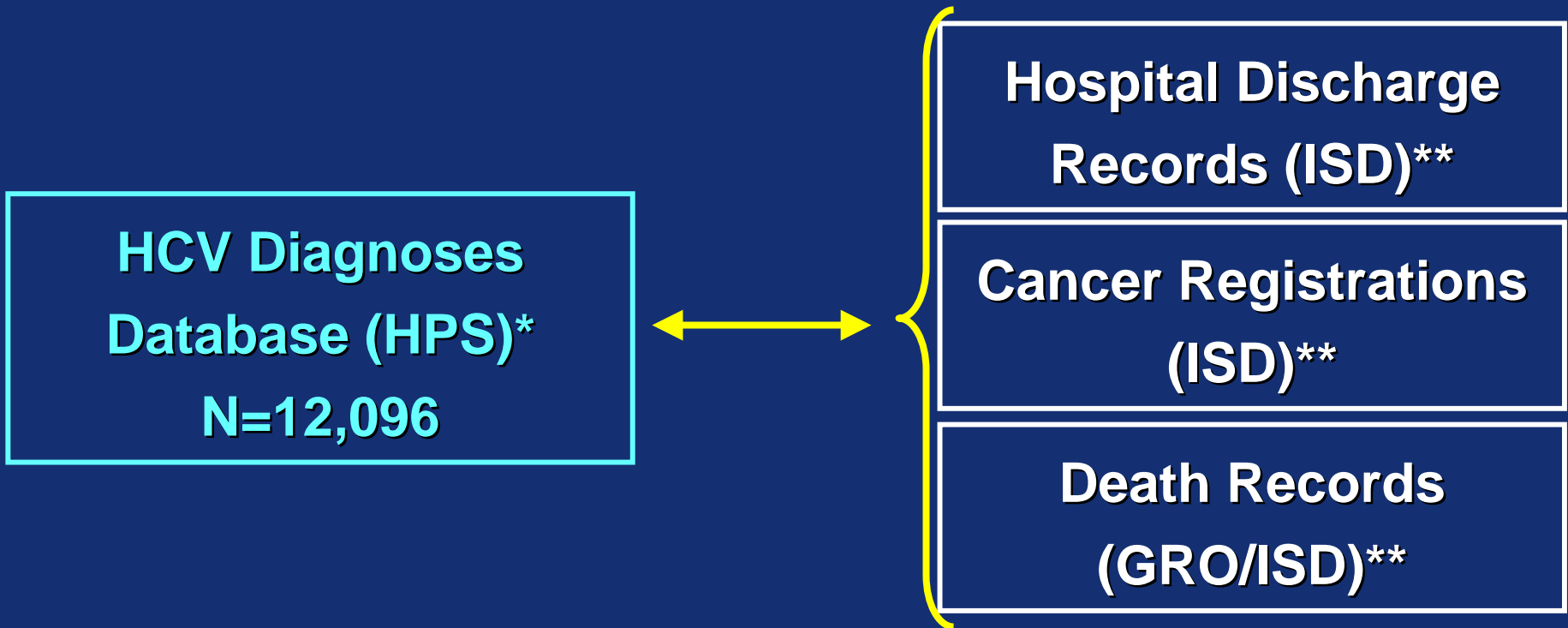
Hepatitis C virus: Natural History

- **Acute Infection**
 - 5% symptomatic disease
 - 60-85% develop chronic infection
- **Chronic Infection** - 5-10% develop cirrhosis by 20 years
- **Factors affecting disease progression**
 - Age, alcohol and HIV
- **Cirrhosis**
 - decompensation (4-9% per annum)
 - carcinoma (2-4% per annum)

Annual and cumulative HCV diagnoses in Scotland (to end of 2003)



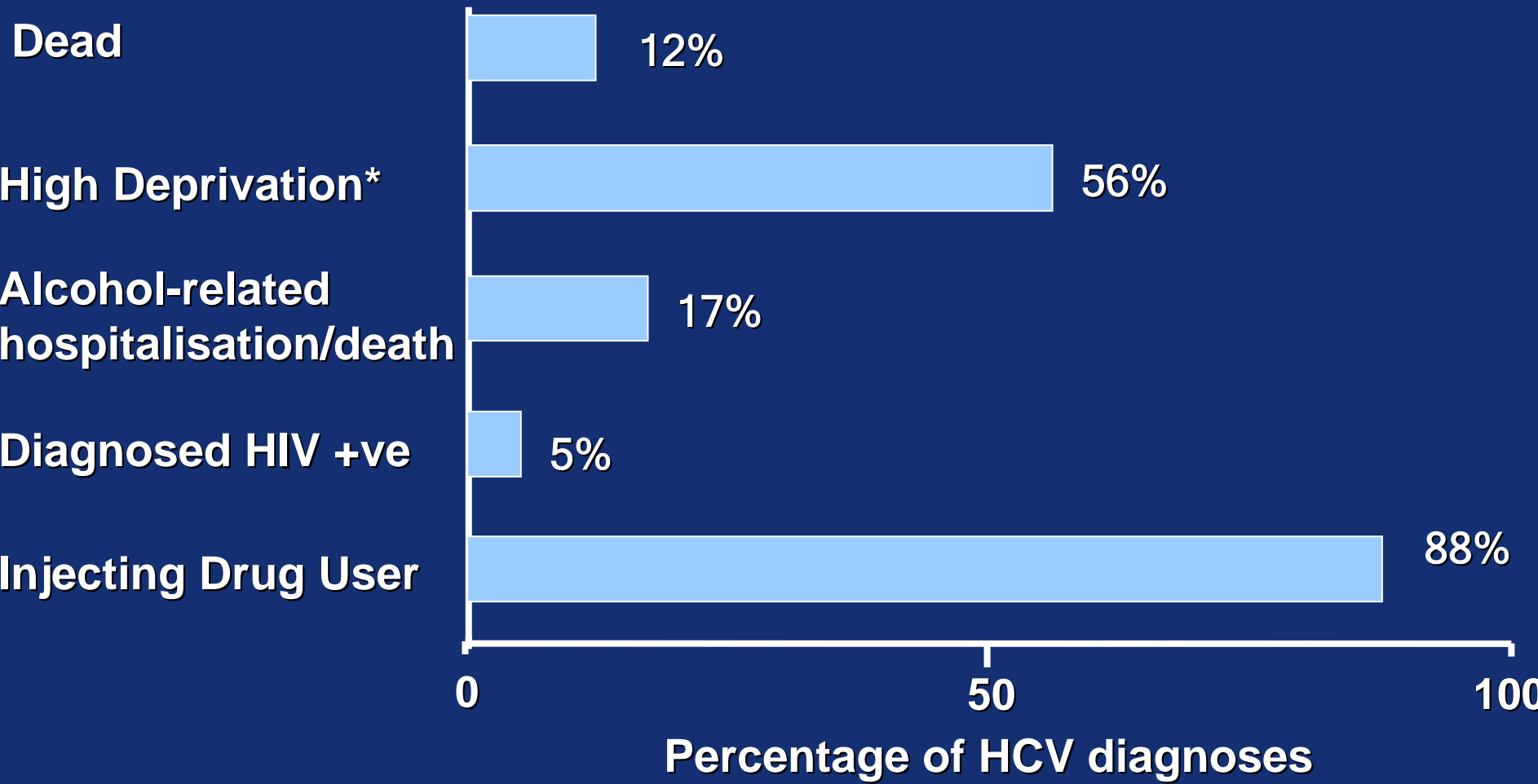
Record-linkage study to determine severe disease burden related to HCV in Scotland, data to Dec 2001



* Limited identifiers

** Full identifiers

Data Linkage Results: Epidemiological Characteristics of 12,096 HCV diagnosed persons in Scotland 1991-2001



* Carstairs 6/7 based on postcode

Data Linkage Results: End-Stage Liver Disease among 12,096 HCV diagnoses in Scotland 1991-2001

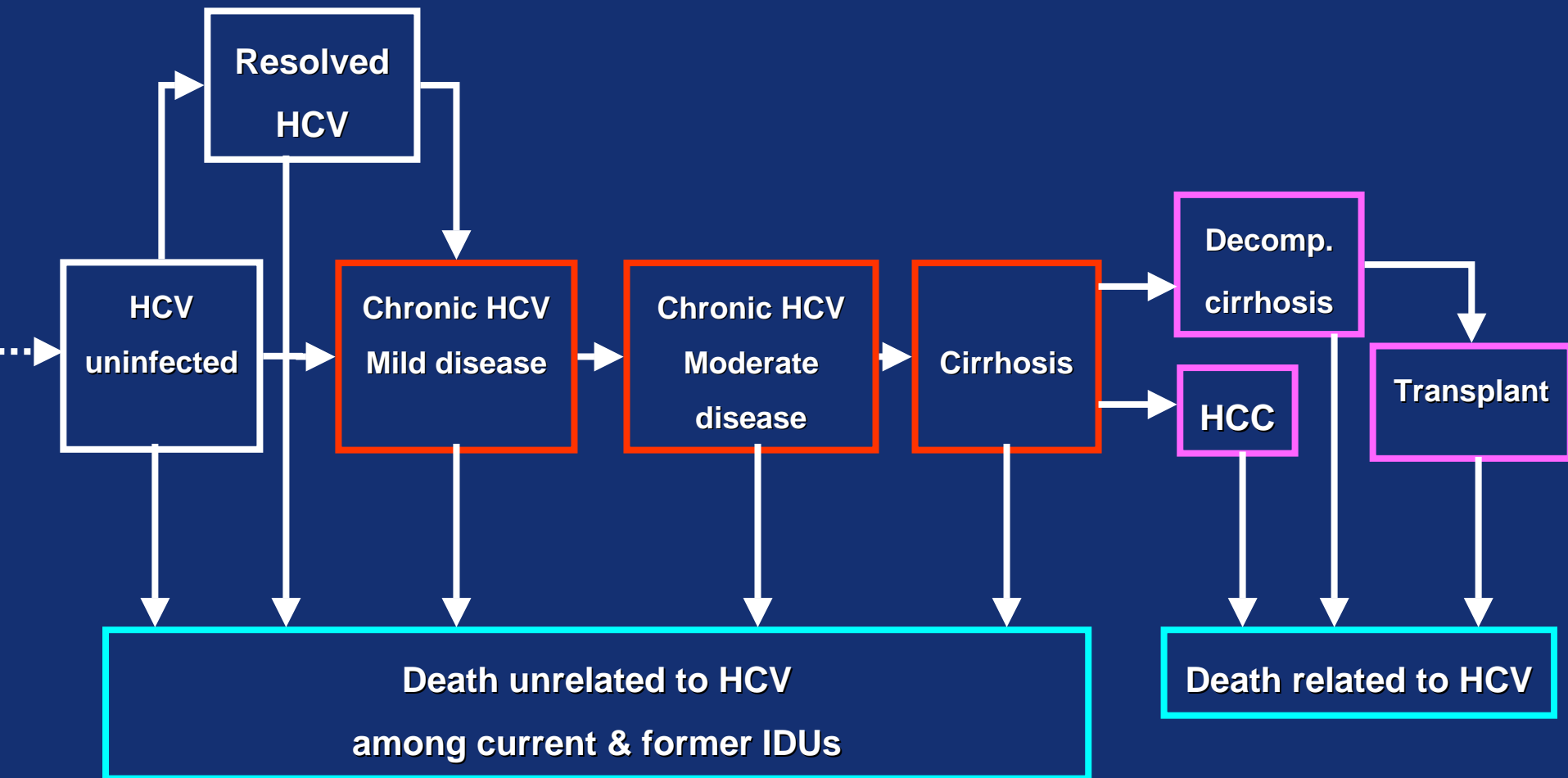
		Hospitalised with Decompensated cirrhosis (N=514)
Year of presentation	1991-1995	134 (26%)
	1996-1998	171 (33%)
	1999-2001	209 (41%)
Health-board of residence	Glasgow	173 (34%)
	Lothian	142 (28%)
	Elsewhere	199 (39%)
Age at presentation	< 30	33 (6%)
	30-49	325 (63%)
	≥50	156 (31%)
Alcohol-related hospitalisation/death	Yes	364 (71%)
	No	150 (29%)
Died		312 (61%)
Died from decompensated cirrhosis		163 (32%)

Modelling the burden of HCV among IDUs in Scotland: overview of projection model

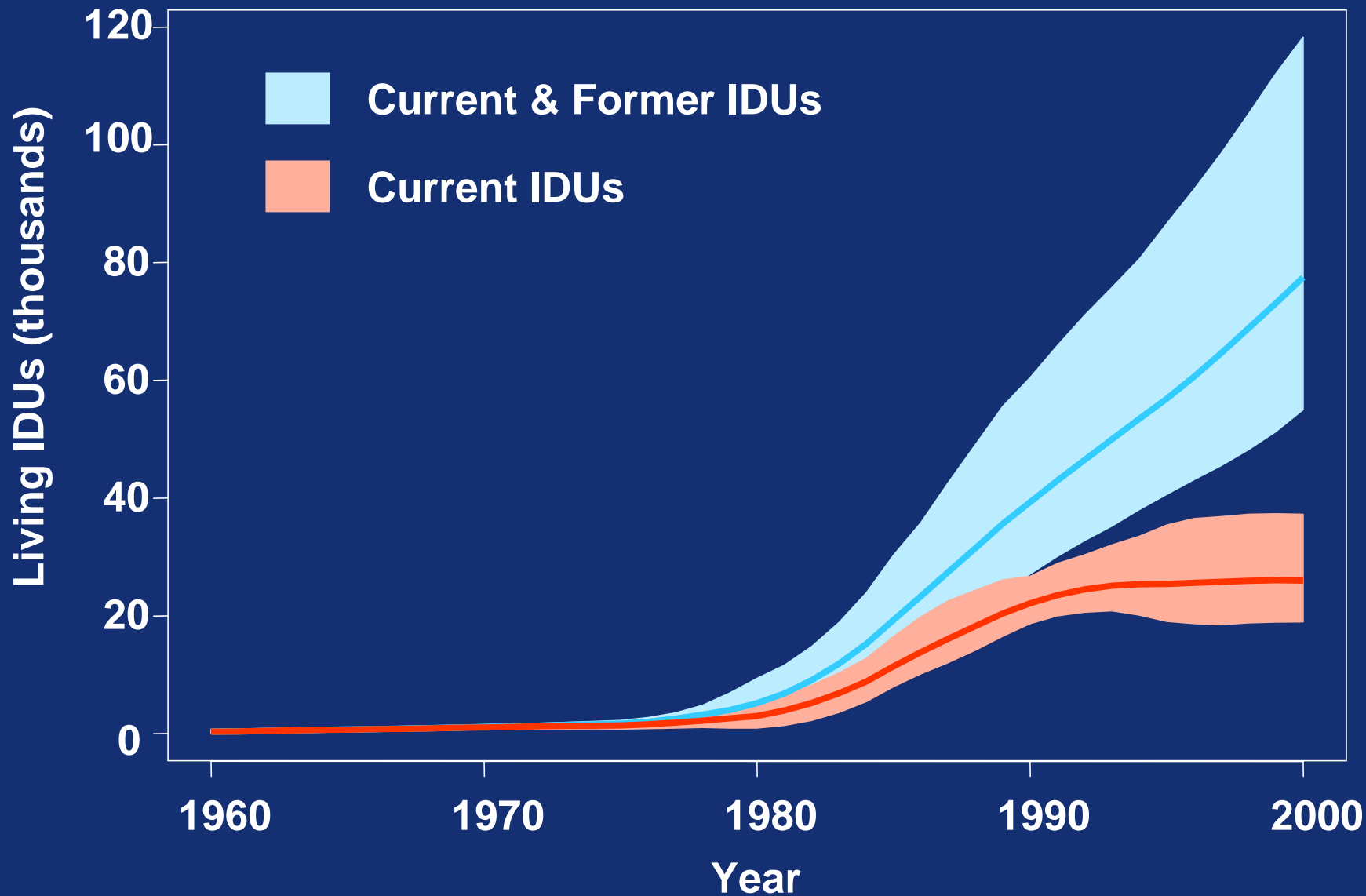
**Designed to incorporate the knowledge and uncertainty about
major parameters relating to:**

- (1) the IDU population (e.g. incidence of injecting),**
- (2) the characteristics of IDUs affecting HCV disease
progression (e.g. HIV co-infection and heavy alcohol use),**
- (3) the incidence of HCV infection among current IDUs,**
- (4) the rate of HCV disease progression**

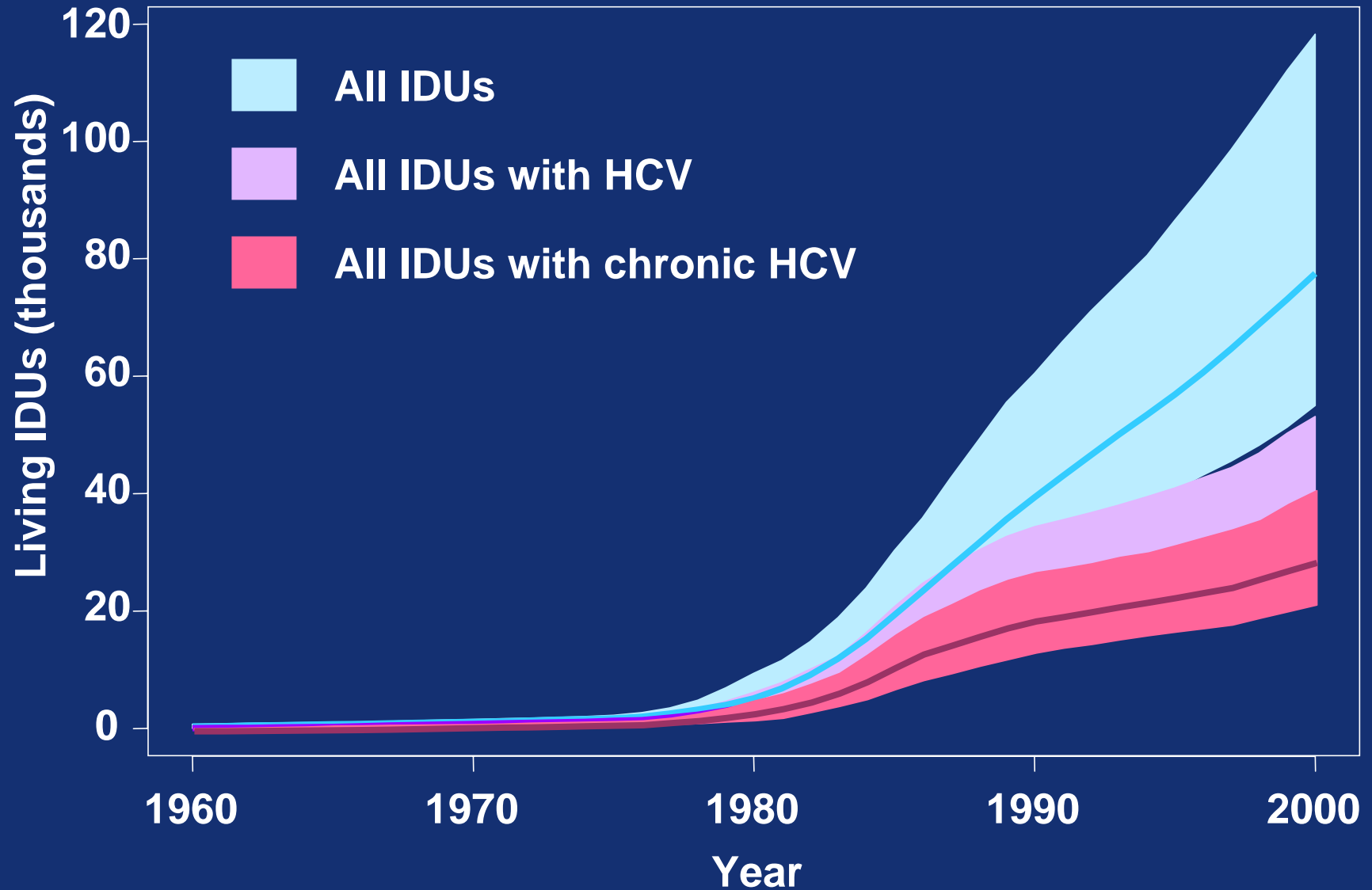
Outline of stages in HCV projection model



Modelled prevalent number of IDUs in Scotland, 1960-2000



Modelled prevalent number of IDUs with HCV in Scotland, 1960-2000



Natural history of HCV disease



No infection

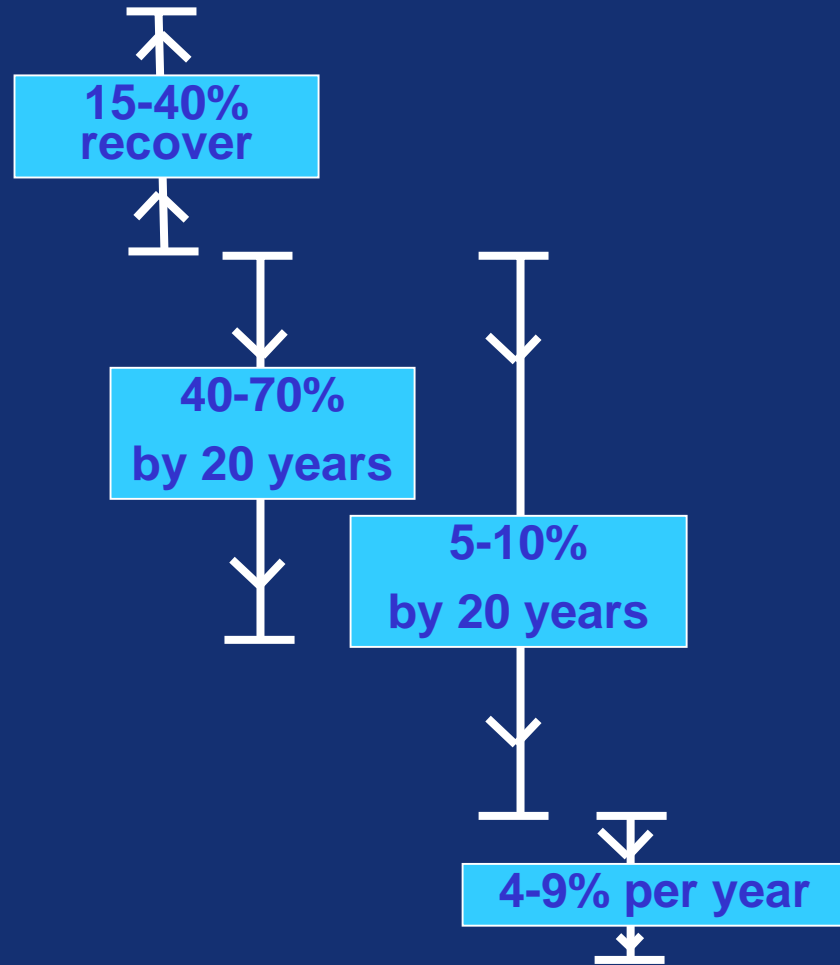
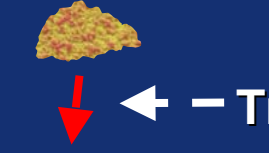
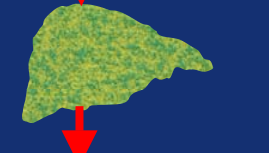
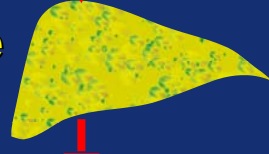
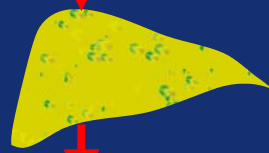
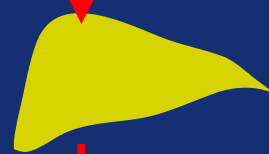
Infection

Mild disease

Moderate disease

Severe disease
(cirrhosis)

Liver failure



Current burden of HCV among IDUs in Scotland, 2005



No infection

1,000-2,000 per year

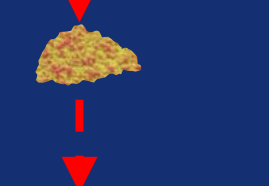
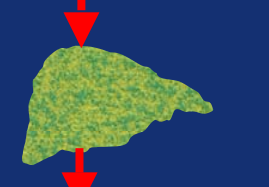
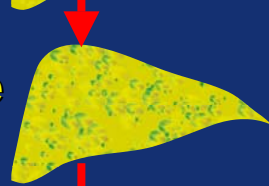
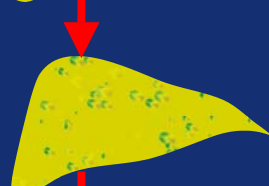
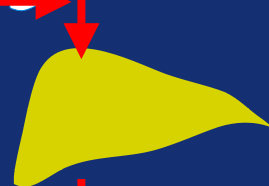
Infection

Mild disease

Moderate disease

Severe disease
(cirrhosis)

Liver failure



All IDUs

Former IDUs

45,000

35,000

22,900

16,000

9,000

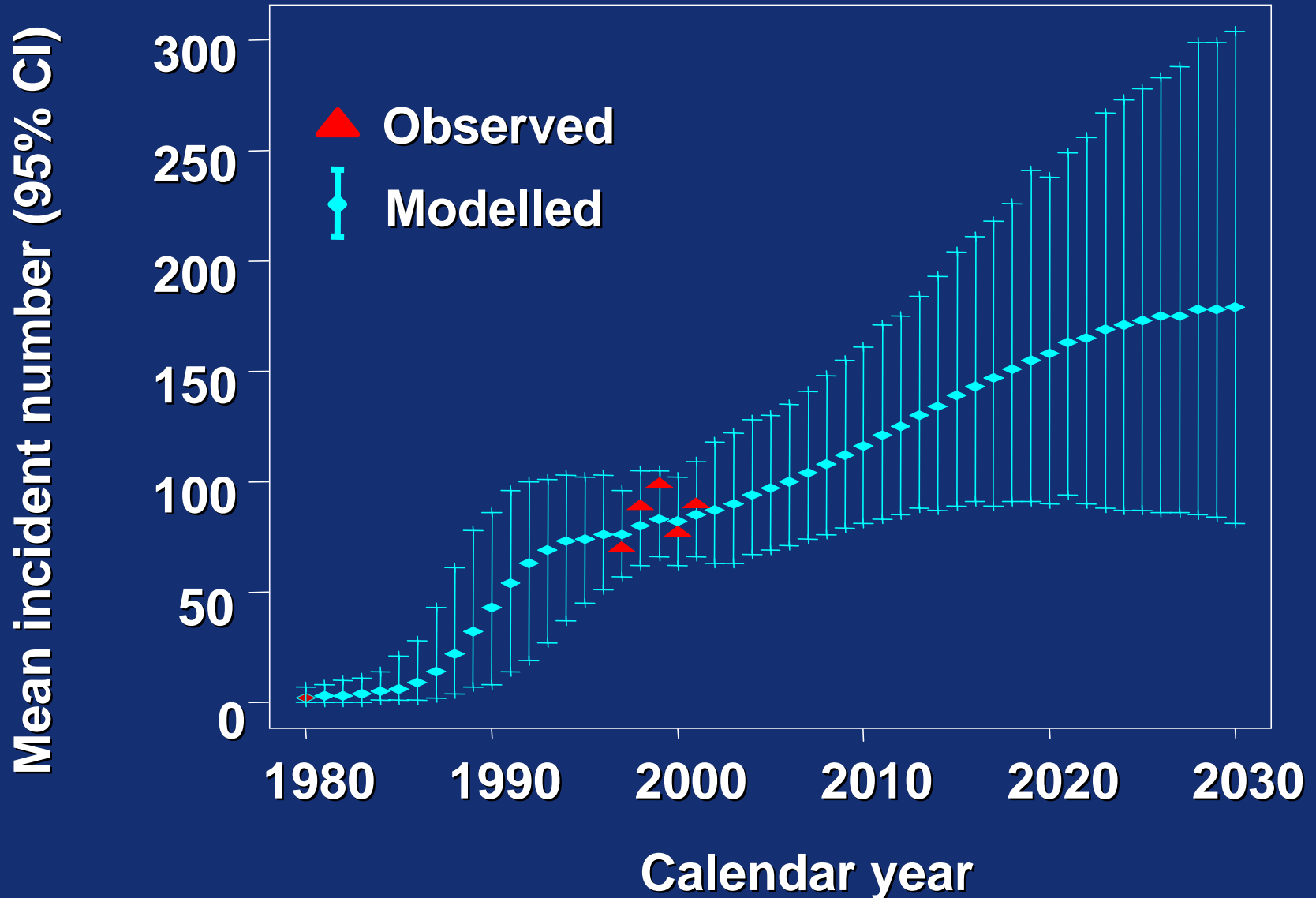
8,000

1,900

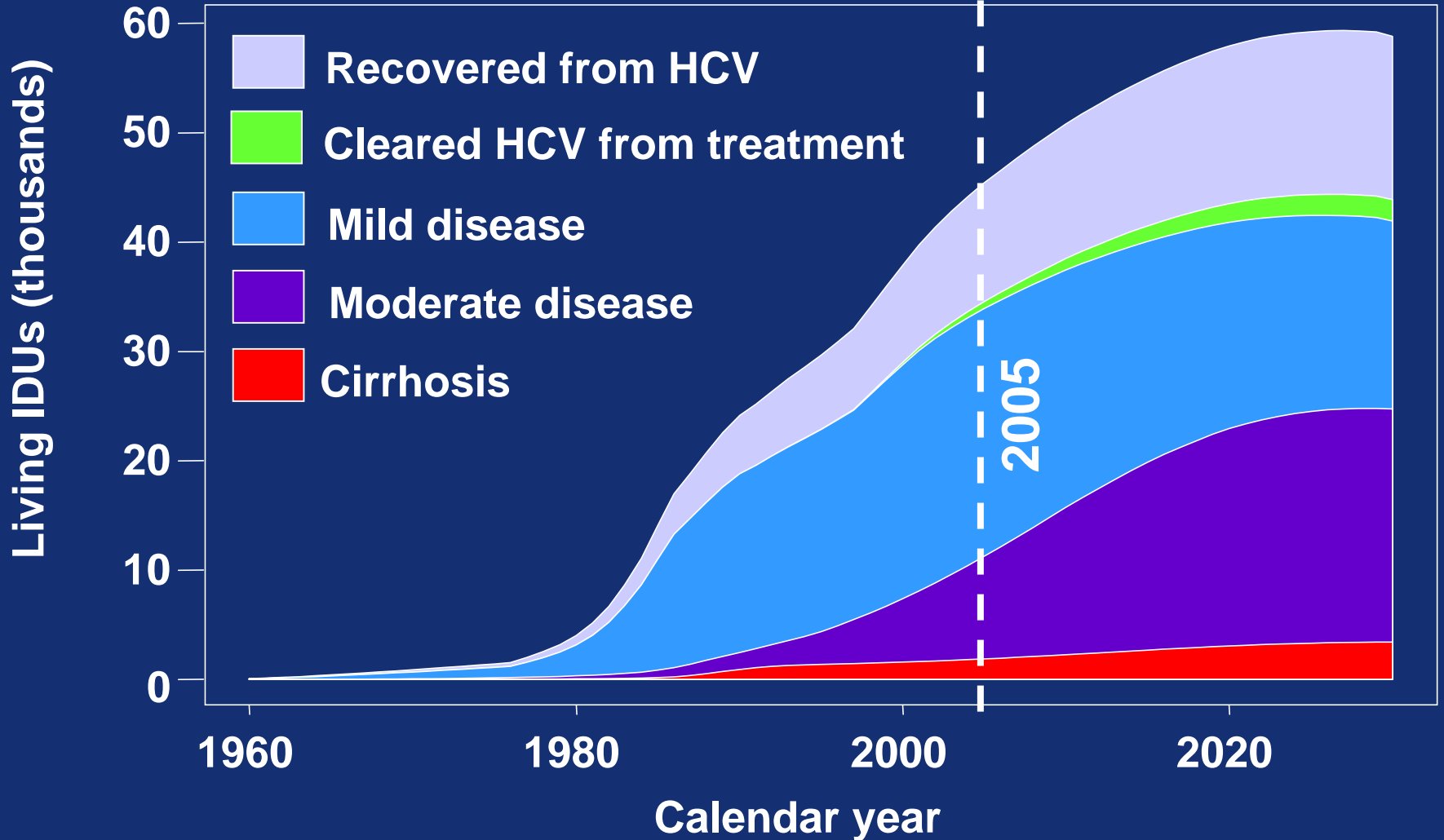
1,800

100 per year

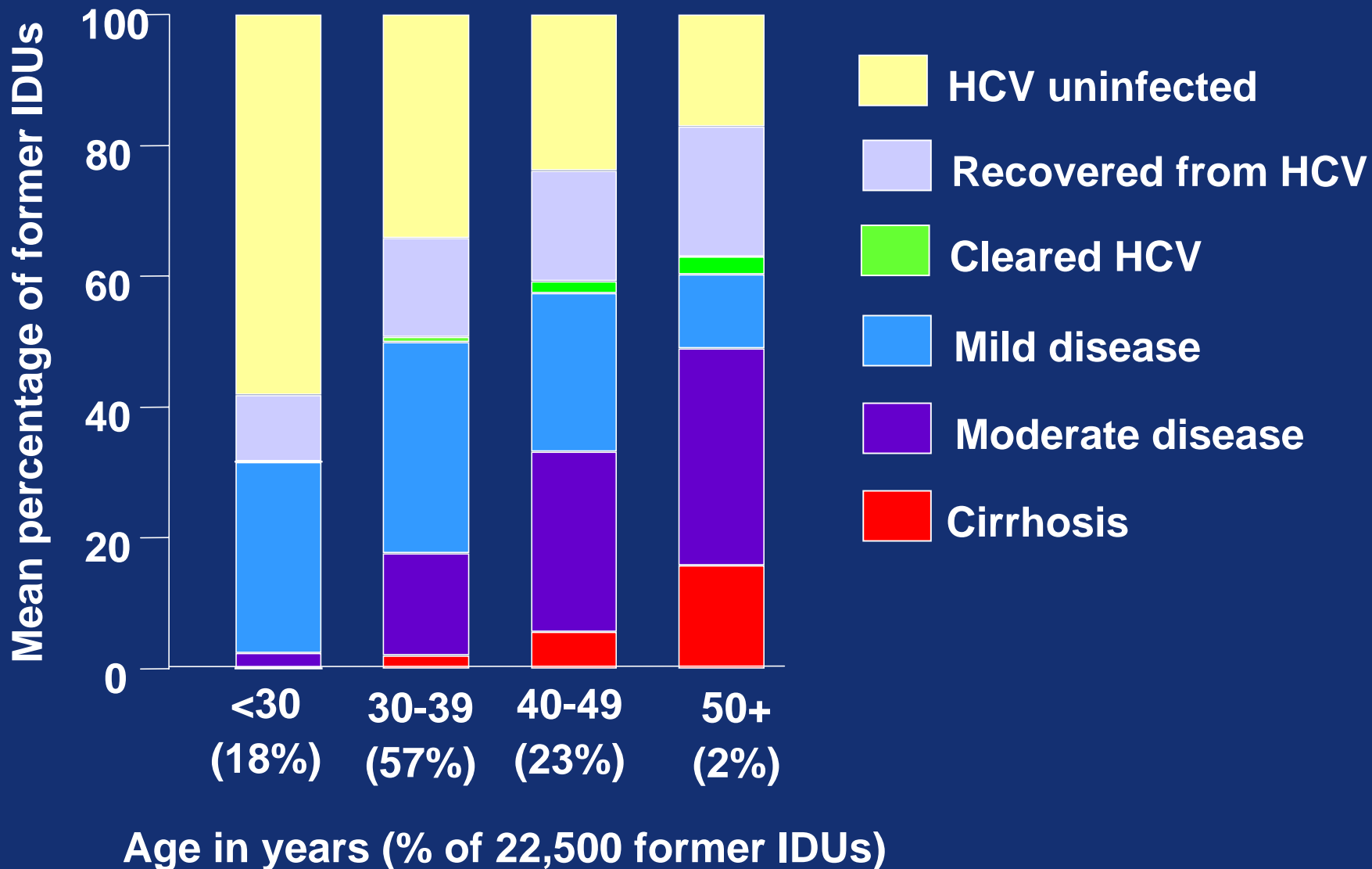
Observed and modelled annual incidence of liver failure among HCV infected IDUs in Scotland, 1980-2030



Modelled prevalent number of HCV infected IDUs in Scotland according to stage of HCV disease, 1960-2030



Modelled distribution of former IDUs in Glasgow in 2005 by stage of HCV disease and current age

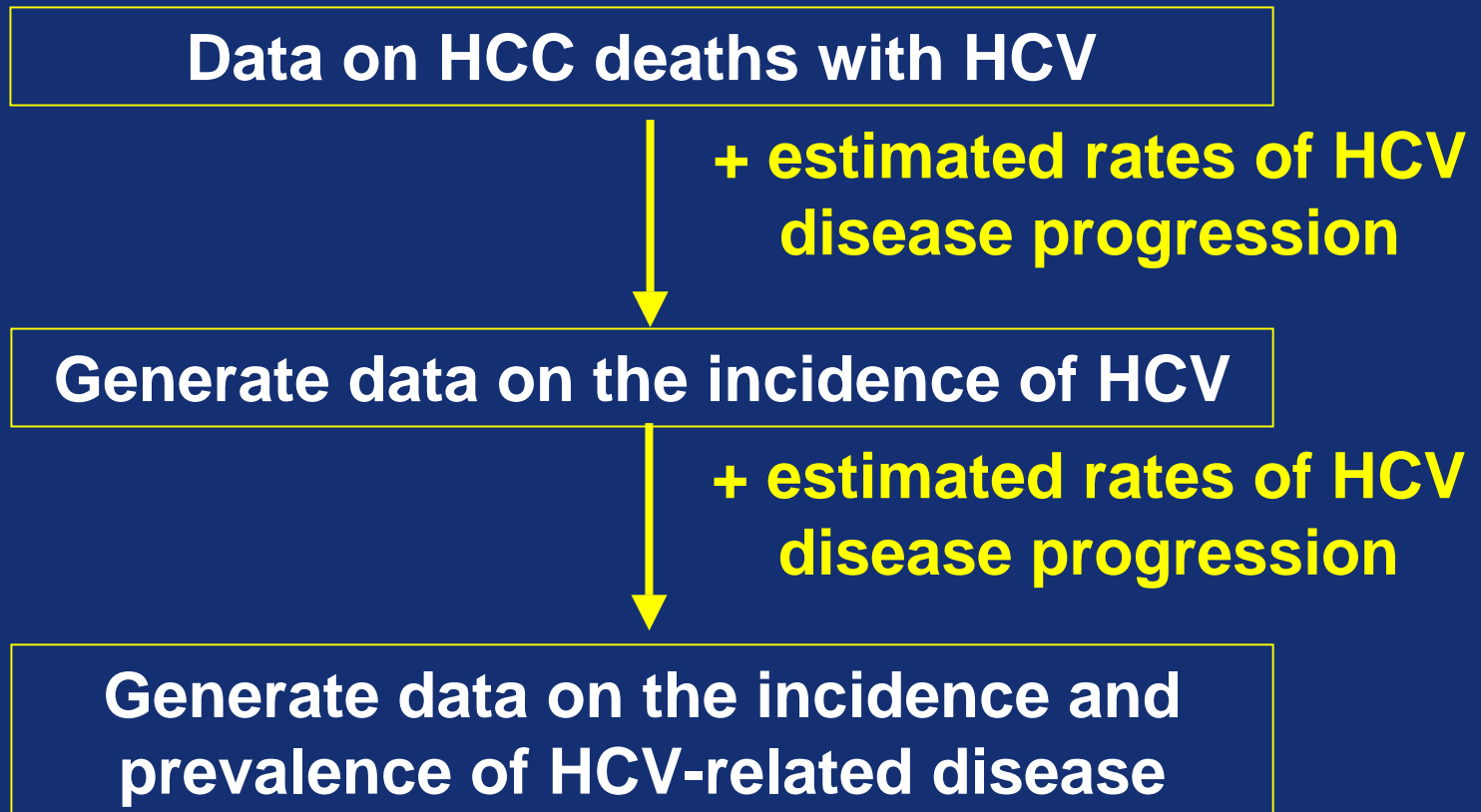


Modelled % of severe HCV disease prevented among IDUs in Glasgow (2006-2030) from different antiviral treatment scenarios

Stage of HCV disease initiated on therapy	Uptake of therapy by former IDUs (N per year)	Modelled % of severe HCV disease prevented according to these response rates to antiviral therapy	
		45% response*	75% response*
Mild or Moderate disease	75	3%	5%
	500	17%	29%
	1,000	30%	50%
Moderate disease	75	5%	8%
	500	28%	47%
	1,000	38%	63%
Moderate disease or compensated cirrhosis	75	6%	10%
	500	35%	58%
	1,000	42%	69%

* Represents compliance to therapy & clearance of the virus from therapy

Modelling the burden of HCV in England and Wales: back-calculation approach



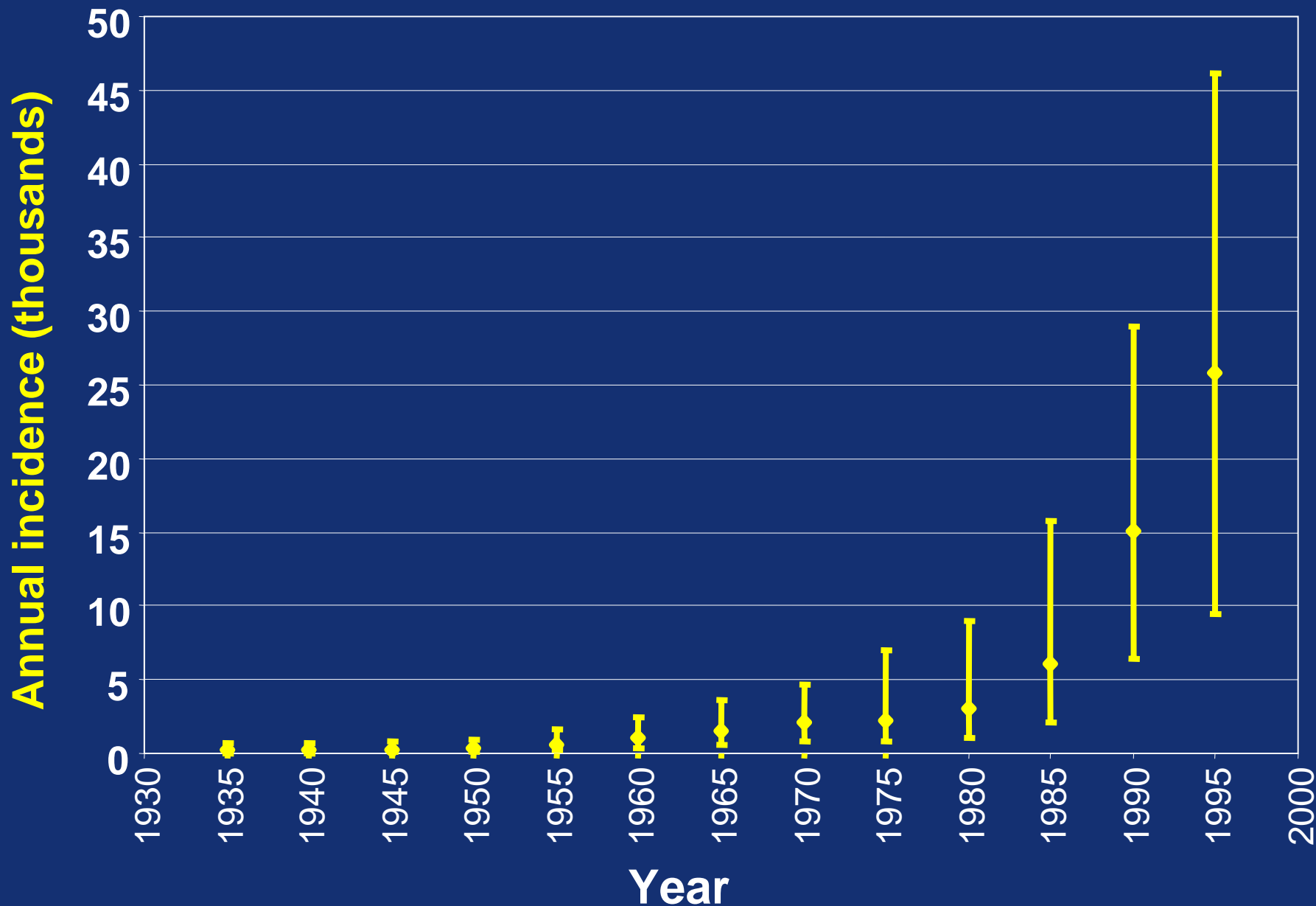
Source: Sweeting M, DeAngelis D, Ramsay M, Brant L, Harris H. The burden of hepatitis C in England and Wales. *In preparation*

Estimated HCC-HCV deaths in England/Wales (1970–2004)*

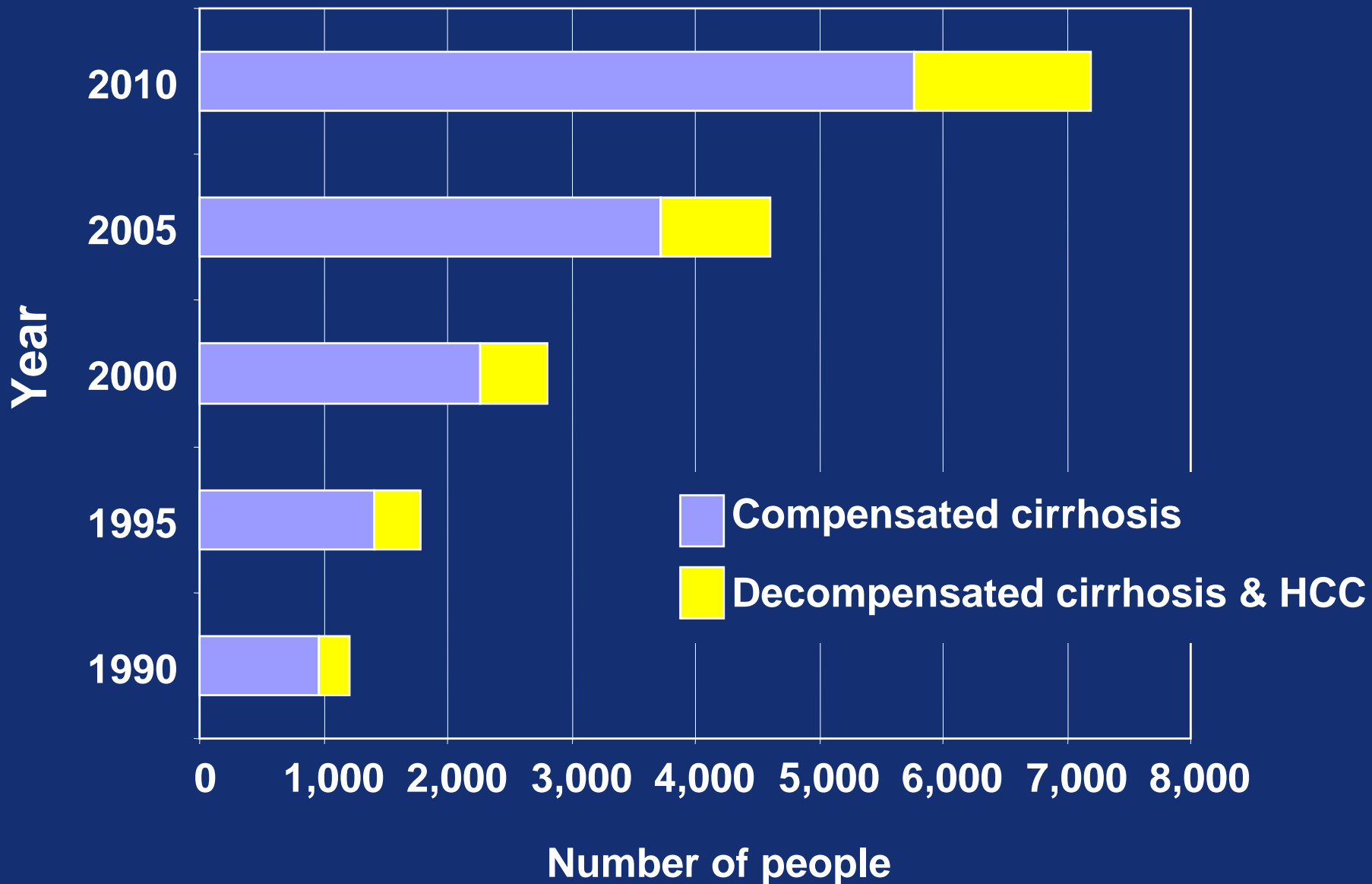


* Estimated based on % of HCC deaths with mention of HCV on death and hospital data (1996-2004) and extrapolated to earlier years.

Estimated HCV incidence in England/Wales (1935-1995)



Estimated number of people living with HCV-related cirrhosis/decomp cirrhosis/HCC in England/Wales (1990-2010)



Summary (1)

- **HCV-related end stage liver disease is not uncommon, is increasing and is usually associated with an alcohol problem.**
- **The young age of decompensated patients presenting to hospital with both HCV and alcohol suggests that the combined effect of these 2 factors accelerates liver disease progression.**

Summary (2)

- **Thousands of past injectors (mostly aged 30-49 years) have chronic HCV and are undiagnosed.**
- **Identifying the above group and considering individuals for therapy should be regarded a priority.**
- **If current low levels of antiviral therapy do not increase in the future, the numbers developing severe HCV disease will increase considerably.**

Acknowledgements

Scotland

- **HPS:** David Goldberg, Kirsty Roy, Sarah Wadd, Glenn Codere, Louise Shaw
- **MRC Biostatistics Unit:** Sheila Bird
- **ISD:** Record Linkage Team
- **Regional Virus Laboratories:** Sheila Cameron (Glasgow), Sheila Burns (Edinburgh), Pamela Molyneaux (Grampian), Paul McIntyre (Tayside)

England and Wales

- **HPA/MRC Biostatistics Unit:** Daniela DeAngelis, Michael Sweeting
- **HPA:** Mary Ramsay, Lisa Brant, Helen Harris

Influence of age, alcohol and HIV co-infection on the development of decompensated cirrhosis (DC) following HCV diagnosis for persons referred from non-hospital settings in Scotland

		Person yrs (py)	Number of DC (rate/1000 py)	Relative Hazard* (95% CI)
Current age	<30	7331	8 (1.1)	1.0 (baseline)
	30-49	12348	79 (6.4)	4.6 (2.2- 9.6)
	50-69	1070	14 (13.1)	8.8 (3.5-22.0)
	70+	254	4 (15.7)	10.7 (3.1-37.5)
Hospitalised for alcohol abuse	Yes	2062	40 (19.4)	6.1 (4.0- 9.1)
	No	18941	65 (3.4)	1.0 (baseline)
Diagnosed HIV +ve	Yes	1018	20 (19.7)	3.9 (2.2- 7.0)
	No	19986	85 (4.3)	1.0 (baseline)

* Cox PH regression adjusted for these factors and gender, healthboard and risk group.