

# Elimination of hepatitis B and C: Filling the gaps in prisons

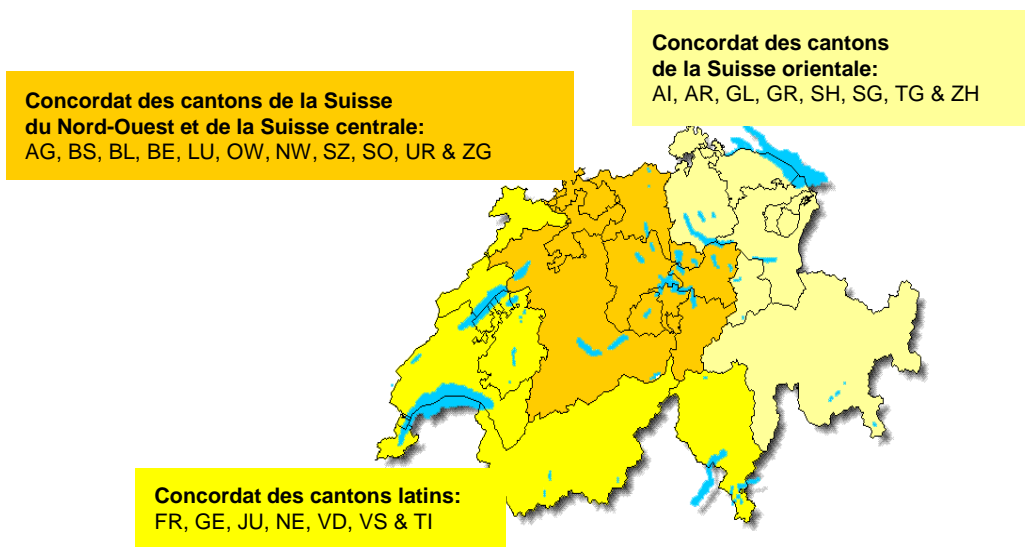
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# Outline

- Prison in Switzerland
- Risk factors for HCV in prison
  - Tattooing
  - Drug use and injection
  - ...
- Screening and treatment

# Incarceration in Switzerland



General population: 8.4 Mio

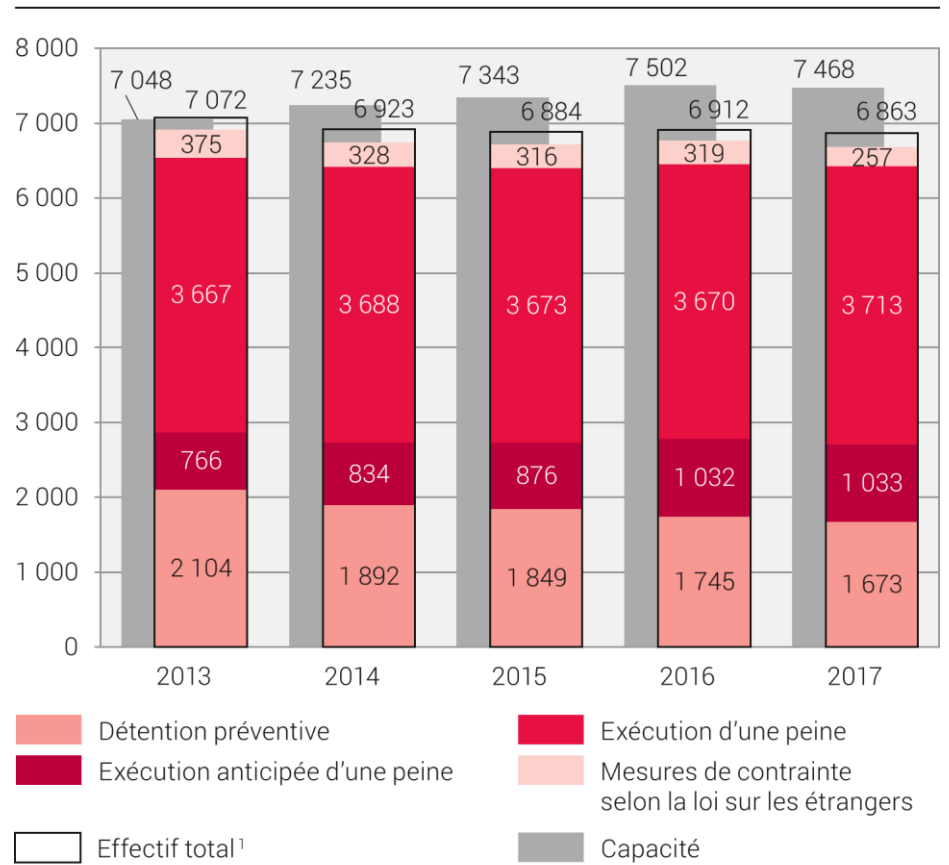
109 Prisons: 83 inmates/100'000 habitants

Women (in %) 6

Foreigners (in %) 72

Minors (in %) 0.4

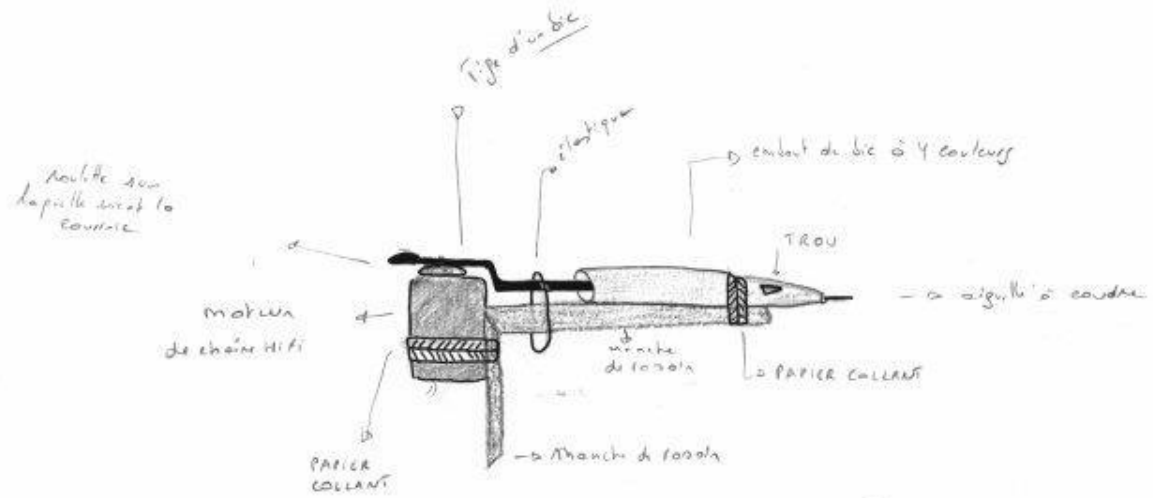
Effectif des détenus selon le type de détention



<sup>1</sup> Total, autres types de détention inclus

# Risk factors for HCV Tattooing





encore de chine  
(encore de bic)  
100-150 €

Le support -> 2 branches de rosario, on retire les lames  
en les faisant fondre, on les soude l'un à l'autre.  
Besoin d'un moteur : ici, celui d'une chaîne hifi  
Quelques autres  
Le fixe au support avec du papier collant  
Prudence -> avec il faut qu'il soit désaxé -> bascule.  
Embout d'un bic à 4 couleurs pour faire office de tige  
Faire un trou dans l'emboîture pour permettre à l'aiguille de tourner.  
-> l'attacher avec du papier collant sur le support.  
Tige -> idéalement tige en métal. Dans les faits, souvent issue d'un bic  
Aiguille -> à attacher à la tige.  
Encore de chine / de bic

« I wanted a big tattoo on my back.  
3 guys got started. It took us 10  
days. By 3 times, our gear was  
confiscated and we made a new  
one with the material of the edge »

# Prevalence tattooing in prison

- Between 5 and 60% of people experiencing incarceration report receipt of a tattoo in prison – mostly clandestine, which is associated with risks of blood-borne infections (BBIs)
- Scotland: 55% with tattoo  
19% report having received it in prison (2007)
- Australia: 41% with tattoo done in prison  
27% report using a used needle and 42% of non-sterile ink
- Canada: 45% of people with tattoo get tattooed in jail

Hellard Am J Infect Control 2007

Milne 2009

WHO 2007

Tran NT: Safer tattooing interventions in prisons: a systematic review and call for action. BMC Public Health 2018

# Addiction in prison (Switzerland)

Substance	General population*	Prison population <sup>°</sup>
Alcohol	4.7%	
Tobacco	30%	
Benzodiazepines	1.3-2.1%	
Heroin	< 1%	
Cocaine	< 1%	
Cannabis	9-31% selon l'âge	



\*Enquête suisse sur la santé 2007,  
Office Fédéral de la Statistique, 2005  
<sup>°</sup> Wolff, BMC Public Health 2011

# Addiction in prison (Switzerland)

Substance	General population*	Prison population <sup>°</sup>
Alcohol	4.7%	20%
Tobacco	30%	61%
Benzodiazepines	1.3-2.1%	22%
Heroin	< 1%	12%
Cocaine	< 1%	20%
Cannabis	9-31% selon l'âge	28%



\*Enquête suisse sur la santé 2007,  
Office Fédéral de la Statistique, 2005  
<sup>°</sup> Wolff, BMC Public Health 2011

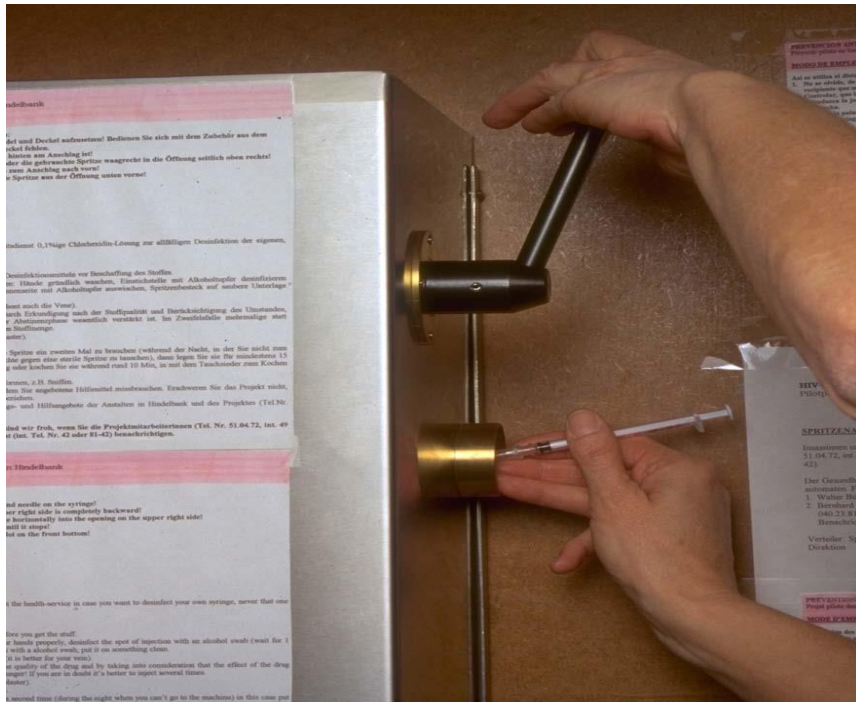




Needle and Syringe exchange for  
intravenous drug users in Prison (PNSP)

	Location	Study population (N)	Injected in prison (%)	Shared equipment (%)
Rutter et al (1995) <sup>22</sup>	Australia (New South Wales)	7 studies	31–74%*	70–94%†
Gaughwin et al (1991) <sup>23</sup>	Australia (South Australia)	50	52%*	60%†
Canadian Correctional Service (1995) <sup>24</sup>	Canada	4285	11%	..
Ford et al (2000) <sup>25</sup>	Canada	350	18.3%	..
DiCenso et al (2003) <sup>26</sup>	Canada	105 women	19%	..
Martin et al (2005) <sup>27</sup>	Canada	102	21%	86%
Small et al (2005) <sup>28</sup>	Canada	>1200	27%	80%
Calzavara et al (2003) <sup>29</sup>	Canada	439 men, 158 women	3.3%	32%
Dufour et al (1995) <sup>30</sup>	Canada	450	2.4%	92%
Edwards et al (1999) <sup>31</sup>	England	378	11.6%	73%
Rotily et al (2001) <sup>32</sup>	Europe‡	871	13%	..
European Monitoring Centre on Drugs and Drug Addiction (2005) <sup>33</sup>	European Union, Norway	..	0.2–34%	..
Malliori et al (1998) <sup>34</sup>	Greece	544	24.1%	92%
Koulierakis et al (1999) <sup>35</sup>	Greece	861	20.2%	83%
Allwright et al (2000) <sup>36</sup>	Ireland	1178	..	70.5%
Rapid Situation Assessment (2005)§	Mauritius	100 men, 50 women, 50 youth (25 men, 25 women)	10.8% of adults, 2.1% of youth	..
Van Haastrecht et al (1998) <sup>37</sup>	Netherlands	497 IDUs	3%	0
Frost and Tchertkov (2002) <sup>38</sup>	Russia	1044	10%	66%
Dolan et al (2004) <sup>39</sup>	Russia	277	13%	..
Gore et al (1995) <sup>40</sup>	Scotland, UK	..	15.9%	..

# Distribution machine: Hindelbank, Switzerland



# Hand-to-hand exchange



# Evaluations

## Prison Needle Exchange Programs (PNSP)

	Incidence of HIV/HCV	Needle sharing	Drug use	Injecting
Am Hasenberge (Germany) <sup>61</sup>	..	Strongly reduced	No increase	No increase
Basauri (Spain) <sup>62</sup>	No seroconversion	Strongly reduced	No increase	No increase
Hannöversand (Germany) <sup>61</sup>	..	Strongly reduced	No increase	No increase
Hindelbank (Switzerland) <sup>63</sup>	No seroconversion	Strongly reduced	Decrease	No increase
Berlin, Germany (Lehrter Strasse and Lichtenberg) <sup>64</sup>	..	Strongly reduced	No increase	No increase*
Lingen 1 (Germany) <sup>65,66</sup>	No seroconversion	Strongly reduced	No increase	No increase
Realta (Switzerland) <sup>67</sup>	No seroconversion	Single cases	Decrease	No increase
Vechta (Germany) <sup>65,66</sup>	No seroconversion	Strongly reduced	No increase	No increase
Vierlande (Germany) <sup>68</sup>	No seroconversion	Little change or reduction	No increase	No increase

\*Two people who had previously only inhaled heroin reported injecting drug use on single occasions. ..=No data.

**Table 2: Assessments of NSPs in prisons (country)**

Jürgens, Lancet Inf Dis 2009

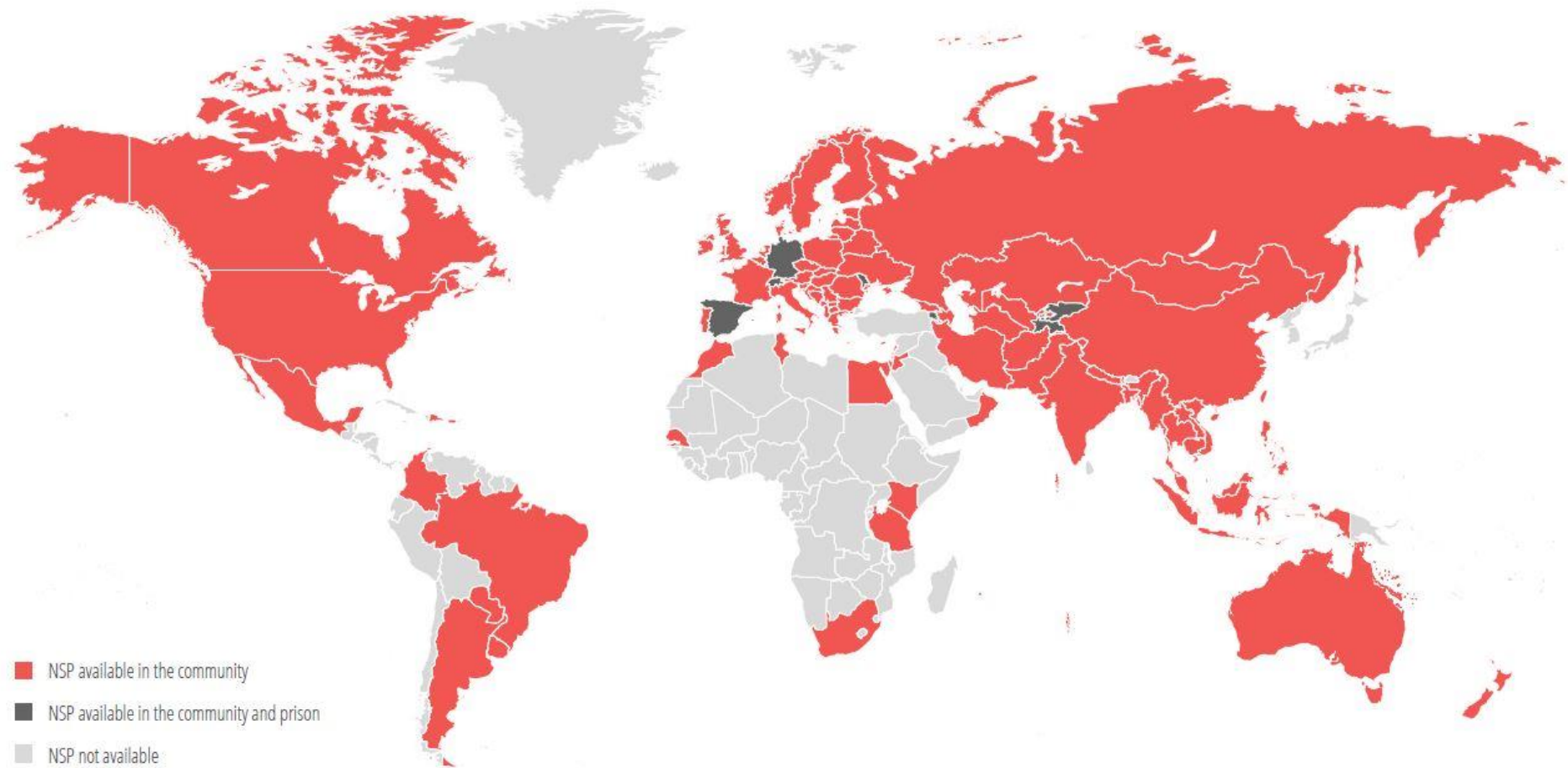
# Proof of efficacy of needle exchange programs in prison

- Prevents HIV infection
- No negative consequences
- No increase of drug use or drug injection
- Needles not used as weapons
- Facilitate referral of drug users to drug dependence treatment programs

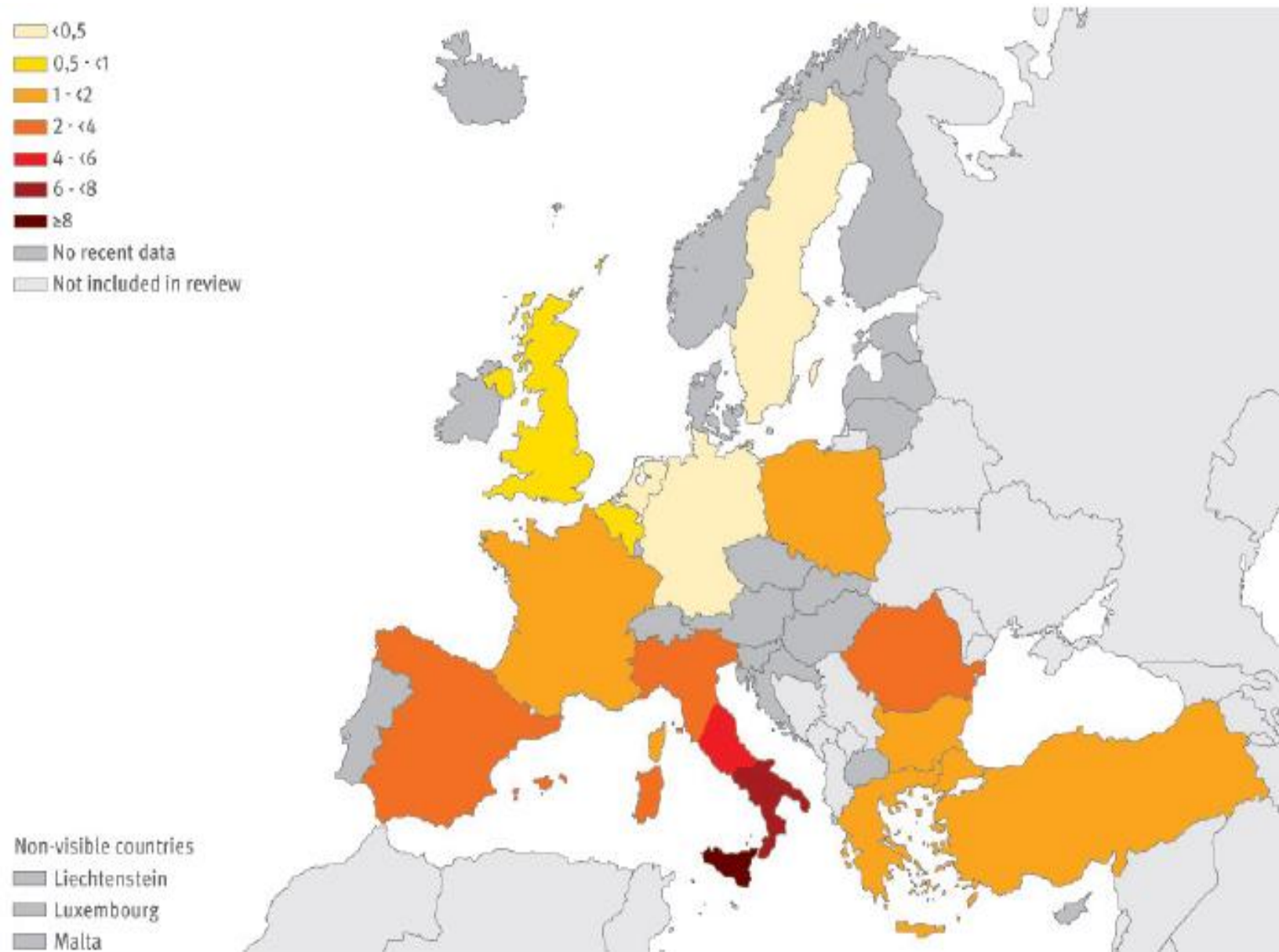
Lazarus, Epi Rev 2018

Jürgens, Lancet Inf Dis 2009

# Global availability of needle and syringe programs (NSP) in the community and in prisons



# Anti-HCV Prevalence in the General European Population



*ECDC Technical Report: Hepatitis B and C in the EU neighborhood, 2010*

# HCV in injecting drug users

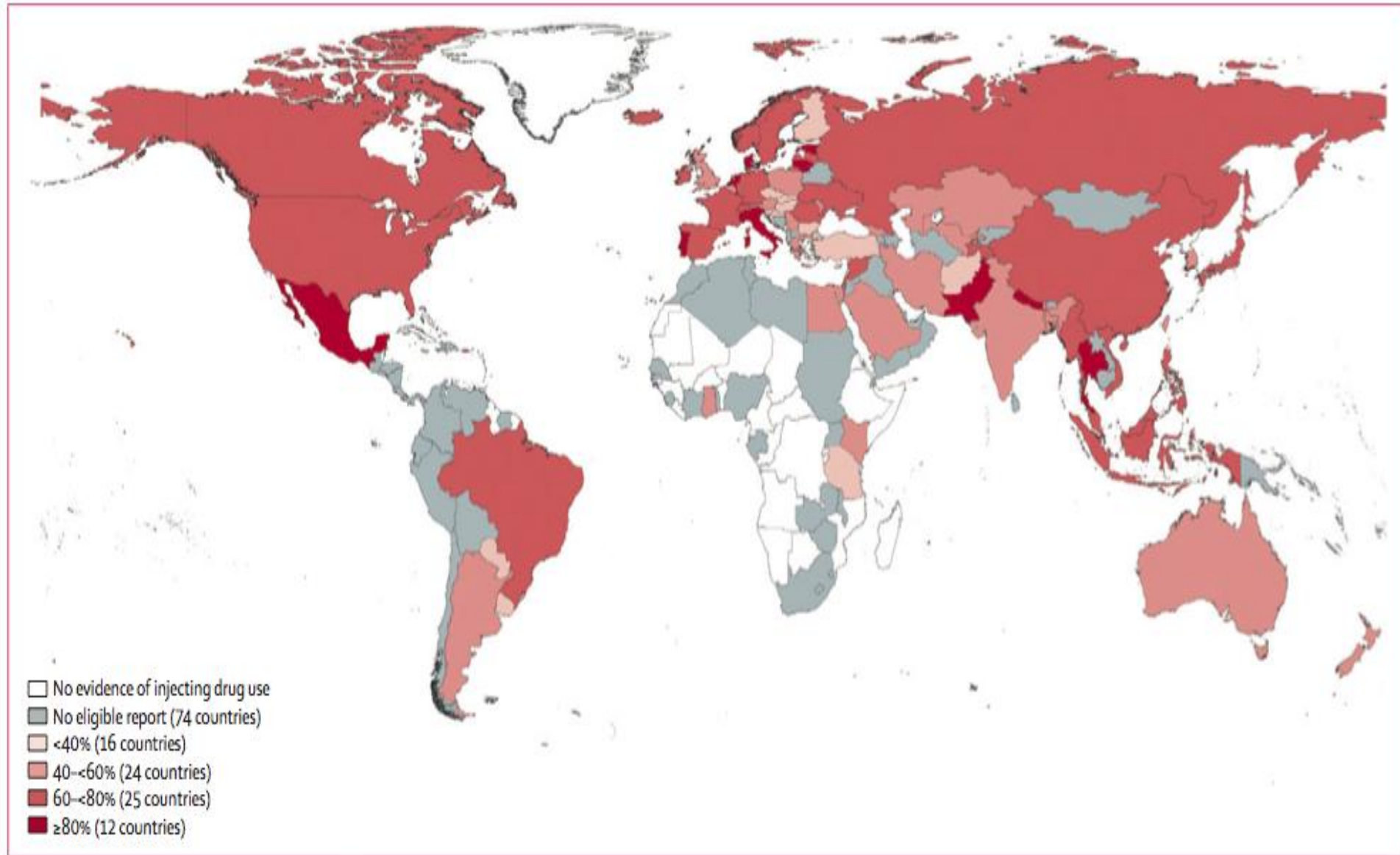


Figure 2: Prevalence of hepatitis C antibodies in injecting drug users

Nelson, Lancet 2011



# HCV prevalence and incidence in custody

- Large variations!
  - Depending in prevalence of IVDU
  - ... and other transmission modes
- Prevalence
  - US: 16-41%, Canada: 28-40%
  - Australia 8-72%
  - EU: 0-58% (IRL 37%, DK 10%, Scot 13-20%, Gre 58%)
  - Geneva: 6.9%
- Incidence
  - 18%/y within incarcerated populations
- US: 29-43% of all HCV+ patients transit each year by a prison!

Weinbaum MMWR 2003

Colvin IOM 2003

Macalino Int J Drug Policy 2004

Sagmeister Eur J Gastr & Hep 2002

Wolff BMC Public Health 2008

Tan Hepatology 2008

Spaulding JAMA 2012

# Treatment DAA

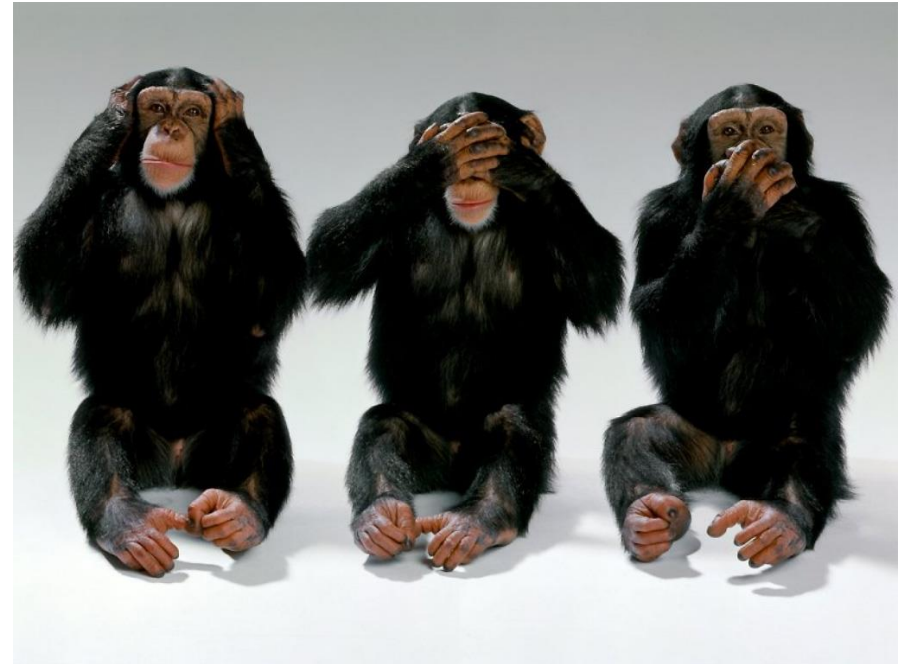
- Barriers to access to DAA:
  - Acknowledgment of the problem (underresearched environment, risk factors for HCV, prevalence, incidence)
  - Insufficient collaboration with public health
  - Insufficient screening: lack of will and possibilities /prison organisation / payment models
  - High cost

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# Problems

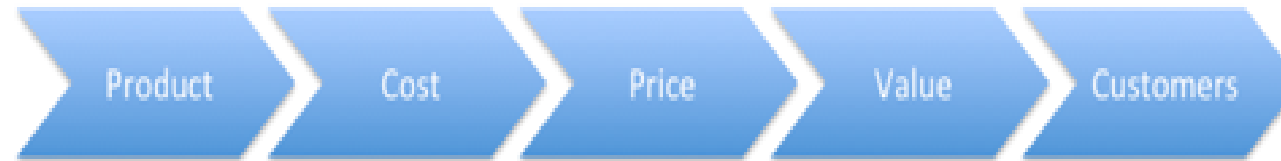
- Access to screening (not systematically done in CH)
- Epidemiological surveillance
- Oversight of prison health
  - Little interest of public health
- Access to treatment



# Pricing models

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## Cost Based Pricing



12 semaines  
sofosbuvir  
**37\$**

+packaging, fabrication, excipients, marge  
de 50%  
**100 \$**

Prix est fixé selon coûts de production, R&D, distribution, etc.

## Value Based Pricing



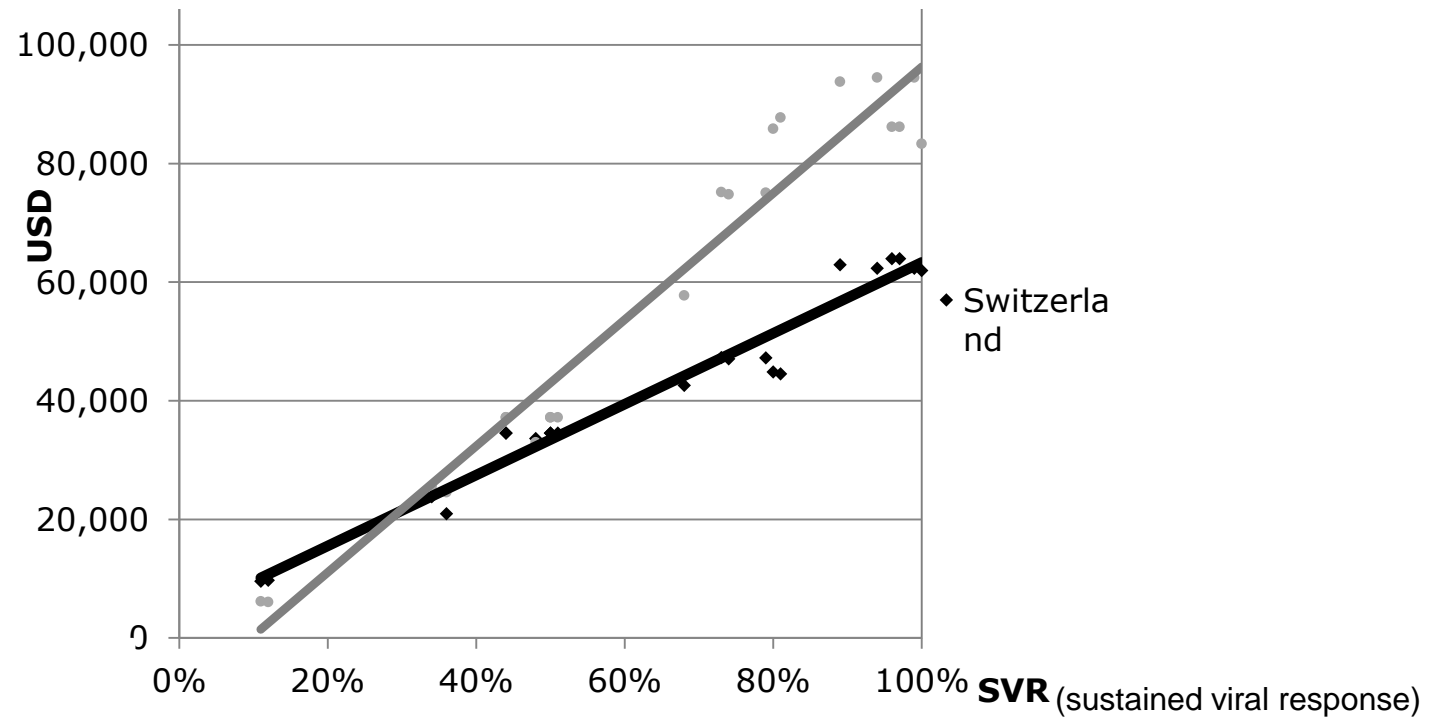
**Frs**  
**57'250**

Prix est fixé selon son efficacité

RESEARCH ARTICLE

# Drug Pricing Evolution in Hepatitis C

Nathalie Vernaz<sup>1,2\*</sup>, François Girardin<sup>1,3</sup>, Nicolas Goossens<sup>4</sup>, Urs Brügger<sup>5</sup>, Marco Riguzzi<sup>5</sup>, Arnaud Perrier<sup>1,6</sup>, Francesco Negro<sup>7</sup>



**Fig 1. Scatter plot of costs against SVR of HCV therapies in Switzerland ( $\rho = 0.98$ ,  $R^2 = 0.96$ ) and the US ( $\rho = 0.98$ ,  $R^2 = 0.95$ ).**

# Strategies for an accessible price

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- Price transparency
- Prize competition
- Price negotiation
- Patent model?
- Compulsory licensing
- Travel to Egypt...
- **Buyers club**

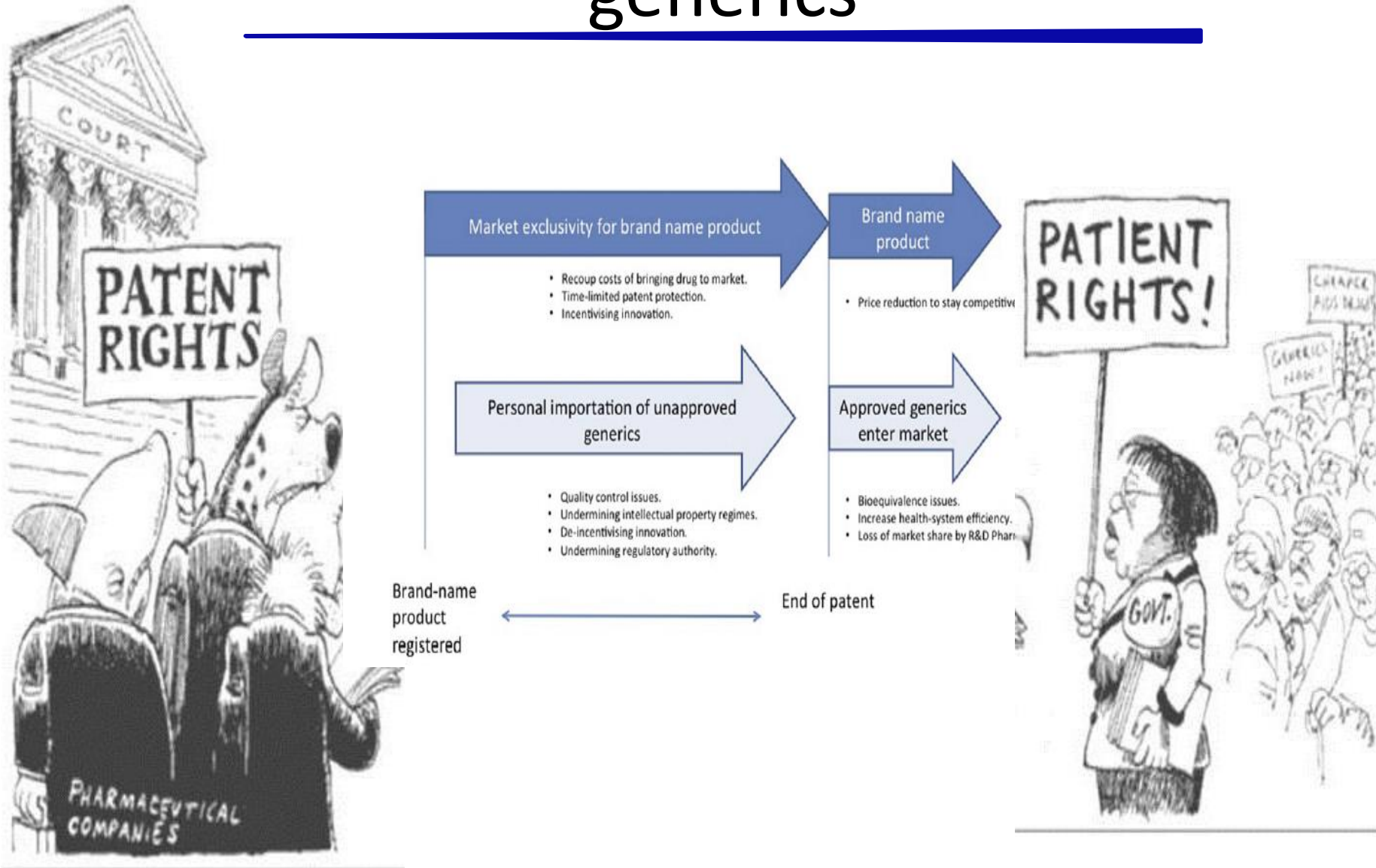


[https://www.youtube.com/results?search\\_query=dallas+buyers+club+bande+annonce+vf](https://www.youtube.com/results?search_query=dallas+buyers+club+bande+annonce+vf)

According to the New York Times, about 10,000 patients have had access to the Buyers Club



# Originals, generics, and unapproved generics



## Arzneimittel- Bewilligungsverordnung, AMBV:

Artikel 36, al. 1

" Eine Einzelperson darf verwendungsfertige Arzneimittel, die in der Schweiz nicht zugelassen sind, in der für den Eigengebrauch erforderlichen kleinen Menge einführen, dh im Gegenwert von einem Monat Behandlung (3 für HCV) oder dem kleinsten Paket, das mindestens einem Monat Behandlungsdauer entspricht."



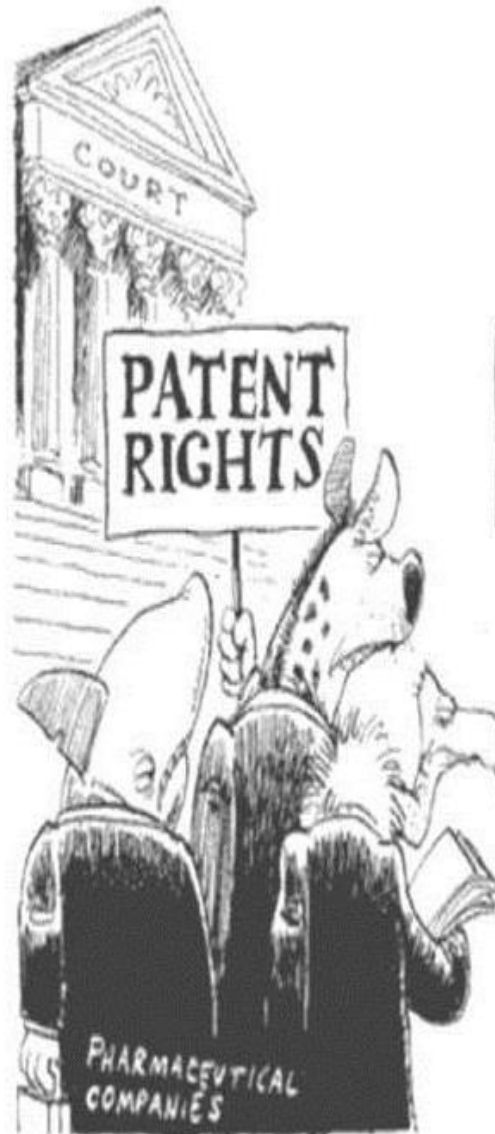
## Ordonnance sur les autorisations dans le domaine des médicaments

(OAMéd) :

article 36, al. 1,

« les particuliers peuvent importer sans autorisation des médicaments non autorisés en Suisse pour leur consommation personnelle, à savoir l'équivalent d'un mois de traitement (3 pour le HCV) ou l'emballage le plus petit qui corresponde à au moins un mois de traitement.»

# Patent rights vs Patient rights



sofosbuvir

Coût du médicament selon les pays  
Pour un traitement de 3 mois par personne



# Buyers club 2017: HCV

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Administrative support for the personal importation of licensed drugs to ensure the:

- Quality of the supplier
- Security of supply
- Necessary medical follow-up appropriate to patients
- Therapeutic education

# Bioequivalence

Table 1: Geometric mean ratio (90% confidence intervals) for generic versus originator HCV DAAs      Cible: 80%-125%

Drug	Company	N	Cmax	AUC <sub>0-∞</sub>
Sofosbuvir	Pharco (Egypt)	36	101.0 (88.1-115.7)	103.5 (97.6-109.7)
Daclatasvir	Pharco(Egypt)	36	106.9 (100.2-114.0)	103.7 (98.3-109.4)
Sofosbuvir	Beker (Algeria)	35	95.4 (84.7-107.5)	98.5 (91.6-106.0)
Daclatasvir	Beker(Algeria)	35	104.1 (93.1-116.3)	103.0 (94.4-112.4)
Sofosbuvir	Hetero (India)	54	95.7 (97.2- 105.2)	100.8 (96.2-105.6)
Sofosbuvir	Natco	N/A	96.1 (81.0-114.0)	100.7 (94.2-107.8)
Daclatasvir	Natco	N/A	94.5 (83.1-107.4)	96.5 (87.1-106.8)
Sofosbuvir	Virchow	24	94.8 (83.3-107.9)	95.8 (86.9-105.7)

# High-quality generic manufacturers: OMS



Essential Medicines and Health Products: Prequalification of medicines

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## Latest News

First generic dolutegravir prequalified  
25 OCT 2017

Bayer AG/Jenapharm's  
ethinylestradiol/levonorgestrel  
prequalified  
25 OCT 2017

Micro Labs' efavirenz 600mg tablet  
prequalified  
25 OCT 2017

## News

### First generic sofosbuvir prequalified

21 JULY 2017

WHO Prequalification Team - Medicines (PQTm) added the below new product to its prequalified list:

- HP001 - Sofosbuvir - 400mg - Tablets - Mylan Laboratories Ltd - INDIA

# Combinations and costs

		Prix 12 semaines	estimation coût 30 patients	estimation coût 40 patients	estimation coût 50 patients
sofosbuvir daclatasvir	Sovaldi® Daklinza®	44 810 28 902 <b>73 713</b>	<b>2 211 381</b>	<b>2 948 508</b>	<b>3 685 635</b>
sofosbuvir/velpatasvir	Epclusa®	<b>30 952</b>	<b>928 566</b>	<b>1 238 088</b>	<b>1 547 610</b>
sofosbuvir/velpatasvir	Générique (FixHepC)	<b>1 500</b>	<b>45 000</b>	<b>60 000</b>	<b>75 000</b>
sofosbuvir daclatasvir	Générique (GSG) Générique (GSG)	<b>200</b>	<b>6 000</b>	<b>8 000</b>	<b>10 000</b>

	sofosbuvir/ledipasvir	sofosbuvir/velpatasvir	ritonavir-boosted paritaprevir, ombitasvir and dasabuvir	grazoprevir/elbasvir	sofosbuvir and daclatasvir	sofosbuvir and simeprevir
<b>génotype 1</b>						
<b>génotype 2</b>						
<b>génotype 3</b>						
<b>génotype 4</b>			sans dasabuvir			
<b>génotype 5 ou 6</b>						

# Take Home Messages

- Prison = high risk environment for HCV
  - Prison = ideal place to identify and treat HCV
  - Many barriers and problems
    - Financing of the treatment
      - Buyers club?
    - Rapid testing
    - Quality of health care in prison (independence, confidentiality, cost management,...)
    - Implication of Public health in prison health
- « Good prison health is good public health »