

IHN in Europe

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in comparison to VHSV only few current data available:

- literature
- organisations (OIE, FAO)
- databases

➤ Distribution of IHNV in Europe

➤ phylogenetic analyses

History

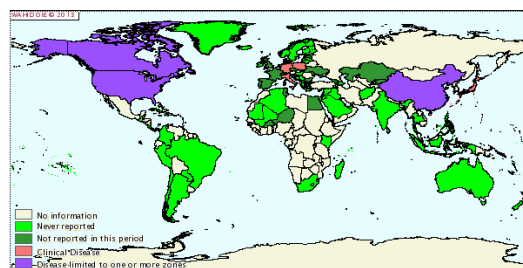
Originally = viral disease of Pacific salmonids (spawn and fingerlings) in river systems at the Pacific coast of North-America

- 1953** Oregon-Sockeye-virus from sockeye salmon (*Oncorhynchus nerka*) hatcheries in **Washington** (Rucker et al. 1953)
- 1960** Sacramento-River-Chinook-Virus from chinook salmon in **California** (*Oncorhynchus tshawytscha*) (Ross et al. 1960)
- 1969** Infectious Hematopoietic Necrosis Virus (IHNV) from rainbow trout (*Oncorhynchus mykiss*) von Amend et al. (1969)
- 1971** IHNV from sockeye salmon (*Oncorhynchus nerka*) in Mori hatchery in Hokkaido **Japan** (eggs from Alaska)
- 1987** **France** (Baudin Laurencin, 1987) and **Italy** (Bovo et al., 1987)
- 1992** **Germany** (Enzmann et al., 1992)

IHNV Reference
OIE Home Page

IHNV distribution maps

01-06/2012



IHNV outbreaks in Europe (Ref.: OIE)

Year	Σ	AT	BE	CH	CZ	DE	ES	FR	HR	IT	NL	PL	RU	SI
1996	11				1			7		3				
1997	45		8	7		11		3		5				11
1998	35	1	1	1		6		1		12				13
1999	35	1		2		9		18		3				3
2000	44			1		6		23		6			1	7
2001	30	1			1	11		8		7				2
2002	37	1		1	3	13		6		2			1	3
2003	28	2		1	2	11		4		7				1
2004	24			1		7		7		7				2
2005	?					5	1	x	x	x				
2006	14				1	12								1
2007	6				1	4								1
2008	28					6		3		18	1			
2009	5					5								
2010	13	1			1	5				5				1
2011	18				1	9		2		2	2	1		1
2012	5					2				2		1		

IHNV distribution: 2005-2012

Austria
 Canada
 China (People's Rep. Of)
Croatia
Czech Republic
France
Germany
 Iran
Italy
 Japan
 Korea (Rep.of)
Netherlands
Poland
Russia
Slovenia
Switzerland
 United States of America

Demonstrated clinical disease

Country	Latest report date	Domestic	Wild	Note
Germany	Jul - Dec, 2012	✓	✗	
Italy	Jul - Dec, 2012	✓	✗	
Japan	Jul - Dec, 2012	✓	✗	
Poland	Jul - Dec, 2012	✓	✗	
Switzerland	Jul - Dec, 2012	✓	✗	

Disease restricted to certain zone(s) / region(s) of the country

Country	Latest report date	Domestic	Wild	Note
Canada	Jul - Dec, 2012	✓	✓	
China (People's Rep. of)	Jul - Dec, 2012	✓	✗	
United States of America	Jan - Jun, 2012	✓	✓	

Classification of IHNV

- no clear differentiation with classical diagnostic methods
- **close serological relationship** → 1 serogroup
- differentiation only with mAb
- original classification is based on the **geographical origin** of the isolates:

RB (Round Butte; Salmon, Alaska and British Columbia),
WRAC (Western Regional Aquaculture Center, freshwater fish)
SRVC (Sacramento River Chinook Virus, salmon, California)

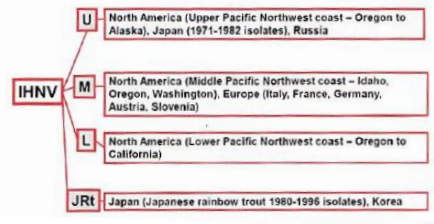
- 1980s Phenotypic and genetic diversity among IHNV isolates from different geographical sources
- * protein electropherotyping (Hsu et al. 1986)
 - * monoclonal antibody reactivity (La Patra et al 1995, Ristow & Arnzen 1989, Winton et al. 1988)
 - * RNase T1 fingerprint analysis (Oshima et al. 1995)
 - * ribonuclease protection assay (RPA) N, G, NV
- Separation into four groups = correlate with the different geographic origin
- 1987 Identification of glycoprotein gene sequence (Koener et al. 1987)
- Increase of data for phylogenetic and comparative investigations
- * highly conservation of G and NV
 - * nucleotide divergence of only 3.6 % (G) - 4.4 % (NV)
- Correlation of phylogenetic relationship with the geographic origin of virus isolates rather than with host species or time of isolation (Kurath et al. 2003)

Antiviral Res. 2012, 95(3):257-81

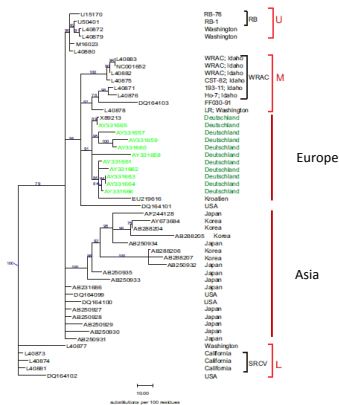
Review

Countermeasures against viral diseases of farmed fish

Frederick S.B. Kibenge^{1,*}, Marcos G. Godoy², Mark Fast³, Samuel Workenhe⁴, Molly J.T. Kibenge⁴



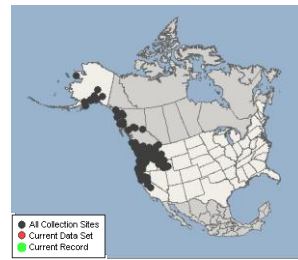
Genotypes of IHNV



Journal of Fish Diseases 2011, 34, 579-587

Development of an aquatic pathogen database (AquaPathogen X) and its utilization in tracking emerging fish virus pathogens in North America

E J Emmenegger¹, E Kentop², T M Thompson³, S Pittam³, A Ryan³, D Keon³, J A Carlino⁴, J Ranson⁵, R B Life⁶, R M Troyer⁷, K A Garver⁸ and G Kurath¹



<http://gis.nacse.org/ihnv/#>

<http://www.cri-fish.eu/>

The Fishpathogens database:



Journal of Fish Diseases 2010, 33, 469–471
An isolate and sequence database of infectious haematopoietic necrosis virus (IHNV)

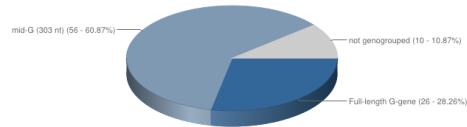
S P Jonstrup¹, H Schuetz², G Kurath³, T Gray⁴, B Bang Jensen⁵ and N J Olesen¹



Geographical Distribution of Isolates

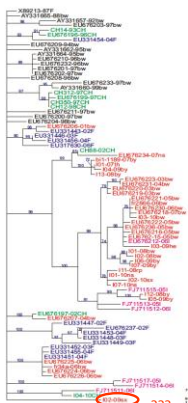
<http://www.cri-fish.eu/>

The Fishpathogens database:

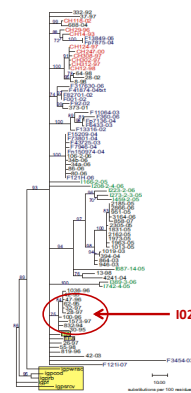


Region Used For Genogroup	Frequency	Percentage
full-length G-gene	26	28.26
mid-G (303 nt)	56	60.87
not genogrouped	10	10.87

IHNV



Germany 1987 - 1999
 Germany 2000 - 2010
 Switzerland
 France
 Italy



Conclusions:

- European IHNV isolates: Genogroup M
- Only few or no sequence information about current IHNV isolates from :
Austria, Croatia, Czech Republic, France, Italy, Netherlands,
Poland, Russia, Slovenia, Switzerland
- Submission of IHNV isolates to EURL Fish for characterisation
- Better understanding about distribution and evolution of IHNV isolates
- Better risk analysis and assessment