

# **National Documentation for Certification of Poliomyelitis Eradication**

**The Icelandic National Certification Committee  
Update 14 June 2000**

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# **National Documentation for Certification of Poliomyelitis Eradication**

## **The Icelandic National Certification Committee**

Update 14 June 2000

### ***Introduction***

The sixth meeting of the European Commission for the Certification of Eradication of Poliomyelitis was held at the Vienna International Center, Austria, 22-24 February 1999. Countries reviewed at the meeting were mainly from the Nordic and Baltic parts of the region. The Commission felt that the Iceland data was comprehensive (Appendix I) and supported the belief that wild poliovirus was absent. The Commission wanted to be assured that the enterovirus laboratories undertake quality assurance procedures, possibly in conjunction with KTL, Finland. The Commission sought reassurance that should there be an importation, and then appropriate interventions would follow immediately (Appendix II).

### **Enterovirus isolations in 1999**

Enterovirus isolations are performed at the Dept. of Virology, National University Hospital in Reykjavik. It is the only virological laboratory in the country and covers the whole population.

### ***Number of diagnoses***

During 1999, enterovirus was isolated from 23 samples of whom 21 was from 20 patients and 2 were from refugees from Kosovo. A surveillance of faecal samples from refugees coming from Kosovo for polioviruses was undertaken. All the strains were typed. Of them 13 were typed at the Dept. of Virology, National University Hospital in Reykjavik and 9 strains were typed in Finland (Tapani Hovi, MD PhD, Enterovirus Laboratory, Department of Virology, Helsinki). Two of the strains were from the same patient, isolated from a faecal sample and a throat swab and only one of them was typed. Table 1 gives an overview over the enteroviral positive samples and clinical information.

### ***Number of investigations***

The main types of cells used at the laboratory for isolation of enteroviruses are A-549 and M-104. A number of other viruses will also grow in these types of cells. Most of the upper respiratory tract samples, faecal samples and cerebrospinal fluids are cultivated in these cells among other types of cells for routine investigation. Therefore it is possible to isolate enteroviruses if they are present in these samples even though there is not always suspicion of enteroviral infection. Table 2 shows the number of samples of cerebrospinal fluids, nasopharyngeal swabs, throat swabs and faecal samples investigated in 1999.

### **Refugees from Kosovo**

In April and May 1999 the laboratory received in total 30 faecal samples for enterovirus surveillance from refugees from Kosovo. Enterovirus was isolated from 2 samples and typing confirmed Echo 3 from one of the samples and Polio type 1 and 2 of vaccine type (OPV) from the other. In addition adenovirus was isolated from 3 of these 30 faecal samples. Of the total of 197 faecal samples investigated for enteroviruses 30 were from refugees from Kosovo.

**Table 1 - Samples positive for enteroviruses in 1999.**

Type of sample	Date of sampling	Sex	Age (year)	Clinical information	Diagnosis of type
Nasopharynx	10.03.99	Male	1	Fever and cold	Cox A9
Faeces	12.03.99	Male	1	Vomit and malaise	Cox A9
Faeces	26.03.99	Male	1	Diarrhoea for 9 days, exanthema	Cox A9
Faeces	21.04.99	Male	1	Diarrhoea, fever	Cox A9
Faeces	23.04.99	Male	10	Meningitis f 5 days, diarrheal for 4 days.	Cox A9
Faeces	14.05.99	?	1	"Refugee from Kosovo"	Polio 1 & 2
Faeces	14.05.99	?	4	"Refugee from Kosovo"	Echo-3
Faeces	26.05.99	Female	2	Diarrhea and vomiting	Cox A9
Throat swab.	16.07.99	Female	42	Pleurodynia 2 days ago, fever	Cox A16
Faeces	18.08.99	Female	2	Prolonged diarrhoea	Cox B5
Throat swab*	23.08.99	Male	2	Hand-foot-mouth disease.	EV-71
Faeces*	23.08.00	"	"	Hand-foot-mouth disease.	"
Throat swab	14.09.99	Female	11 month	Repeated sore throat	EV-71
Faeces	14.09.99	Male	2	Diarrhoea	EV-71
Faeces	08.10.99	Female	<1 month	Fever	EV-71
Faeces	25.10.99	Male	11 month	Prolonged diarrhoea	Cox B3
Faeces	27.10.99	Male	2	Prolonged fever and diarrhoea	EV-71
Faeces	12.12.99	Female	4 month	Diarrhoea	Echo-25
Faeces	15.12.99	Male	1	Diarrhoea, arthritis, exanthema	Cox B6
Nasopharynx	19.12.99	Female	1	Cough, malaise, fever, pneumonia	Echo-18
Nasopharynx	21.12.99	Female	6 month	Fever, upper respiratory tract infection	Echo-25
Faeces	29.12.99	Male	13	Meningitis	Echo-18
Throat swab	31.12.99	Female	40	Fever, symptoms of meningitis	Echo-18

\* Samples from the same individual

**Table 2 - Samples for isolation of enterovirus in 1999.**

<b>Samples</b>	<b>Total number of samples</b>	<b>Number of samples investigated for enteroviruses</b>	<b>Number of samples positive for enteroviruses</b>
<b>Faeces</b>	229	197	16
<b>Throat swab</b>	285	221	4
<b>Throat irrigation</b>	5	5	0
<b>Nasopharynx</b>	231	197	3
<b>Cerebrospinal fluid</b>	182	104	0

### **Acute Flaccid Paralysis (AFP)**

Although there is no formal AFP surveillance in Iceland an ongoing additional investigation of AFP in Iceland looking for children with the diagnoses of Guillain Barré (G61.0, 357.0), transverse myelitis G37.3, 323.9), acute monoplegia (G83.3; G80.8; G83.1; R29.8, 344.5; 344.3; 781.4; 344.4) and spinal muscular atrophy (G12.9; G12.2; A80.3, 336.8; 335.1; 045.1; 323.2; 045.9; 045.2) has detected 47 cases during the period of 1981 - 1998 (18 years). The detection rate of AFP is approximately 4/100 000 in the age group under 15 years of age. None of these cases are considered to be due to poliomyelitis.

### **Conclusion**

A high testing rate of faecal samples and cerebrospinal fluid samples is maintained in Iceland. Of the 197 faecal samples tested for enteroviruses 16 were positive (8%) in 1999. The testing proved effective in detecting polioviruses. The polioviruses were proved to be of oral polio vaccine strains (final diagnosis at KTL, Finland). The Icelandic population is protected from poliomyelitis by high vaccine coverage (>99%) with IPV. Refugees coming to Iceland will enter the Icelandic vaccination program including IPV vaccination.

The total population of children less than 15 years of age is currently only 64.711 (year 1999). It will be difficult to maintain effective AFP surveillance system in a small population where the disease is absent and zero detection of AFC may be expected for some years.

## **Appendix I**

### ***National Documentation for Certification of Poliomyelitis Eradication***

#### ***The Icelandic National Certification Committee***

#### ***Preliminary report***

***February 1999***

#### **Introduction**

The Icelandic Health Authorities appointed in October 1998 a National Committee for the Certification of Poliomyelitis Eradication in accordance with a request from the World Health Organisation European Regional Office. Three members were appointed to the committee:

- ✓ **Dr. Arthur Löve, Chief, Department of Virology, National University Hospital, Reykjavik, Iceland, Chairman of the committee**
- ✓ **Professor Elias Olafsson, Department of Neurology, National University Hospital, Reykjavik, Iceland**
- ✓ **Dr. Thorolfur Gudnason, Department of Paediatrics, National University Hospital, Reykjavik, Iceland**

The secretary of the National Committee for the Certification of Poliomyelitis Eradication is Dr. Heraldry Brie, State Epidemiologist, Directorate of Health, Division of Infectious Disease Control.

#### ***Iceland - Background Information***

The population and demography.

Iceland is an island in the North Atlantic, 103.000 km<sup>2</sup> in size. The population is mainly of Nordic and Celtic origin. Iceland was settled in the 9<sup>th</sup> century mainly with Norwegians and people from the British Isles and Ireland. The social structure, political, economical and cultural features are similar to those in Scandinavia and the standard of living is high.

The total population of Iceland was 272.381 as of 31 December 1997. More than half of the population, or 164.634 inhabitants, was living in the Capital (Reykjavik) area located in the Southwest corner of the island; the remainder of the population was mainly living in villages scattered in along the coastline.

Those under 15 years of age were 24 % of the total population in 1997. The age distribution by gender is shown in Fig. 1.

In 1996 the number of life births was 4.329. The life expectancy at birth was 76,2 years for males and 80,6 years for females. The total number of deaths per 100.000 population was 736 for males and 661 for females.

### The Health Care System

The health care system in Iceland is publicly funded. It is divided into 8 districts including 80 health care centres (Fig. 2). The funding comes from the central government. The policy is to assure equal access to the health care system by low consumer cost through primary health care services. Anyone is, however, equally free to visit specialist doctors.

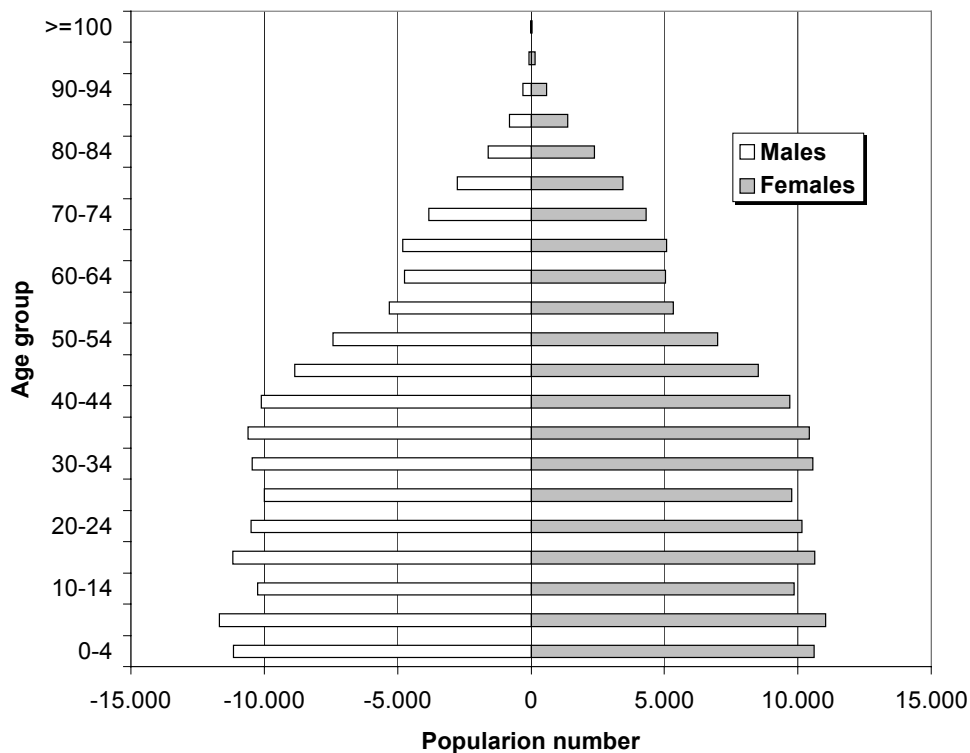


Fig. 1. The Icelandic population by gender and 5 year age groups as of 31 December 1997.

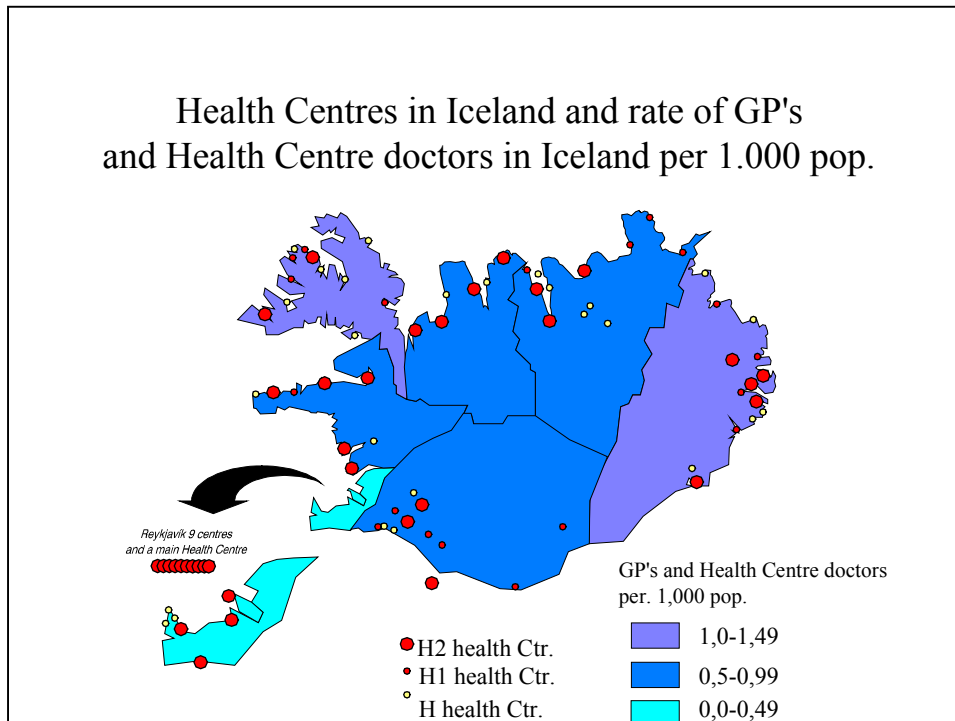


Fig. 2. Primary health care coverage in Iceland in urban and rural areas.

### Responsibility for Infectious Disease Control

The State Epidemiologist at the Directorate of Health in Iceland is responsible for infectious disease control in the country. At the district level the District Physicians are responsible for the control measures such as poliomyelitis immunisations activities.

Enterovirus laboratory work, including poliomyelitis isolation and identification is done at the Department of Virology at the National University Laboratory, which is the only virological laboratory in the country.

Poliomyelitis is a mandatory notifiable disease. Diagnosing physicians and the laboratory report to the State Epidemiologist who is responsible for the implementation of control measures such as patient isolations and immunizations.

## History of Poliomyelitis in Iceland

The first major epidemic of paralytic poliomyelitis hit Iceland by surprise in 1924 (Public Health Reports, 1921-1925). However, outbreaks of poliomyelitis, all small in size, had been noted in Reykjavik in 1904, then outside the capital in 1905 and in 1914-1915 (Sigurjónsson J, Icelandic Medical Journal 1948; 33:48-68). Sporadic cases of poliomyelitis were noted in the years 1918, 1920 and 1922-1923. Following the epidemic in 1924 seven epidemics of poliomyelitis followed with the last one in 1955 (Fig. 3). Poliomyelitis did not become endemic in Iceland probably due to the sparsely populated island. The last nine indigenous cases were diagnosed in 1960 (two of them paralytic), all belonging to the same family. The poliovirus isolated was of type I (Gudnadottir M, Icelandic Medical Journal 1966;52:103-17). The last case of poliomyelitis was imported in 1963 (Gudnadottir M International Symposium on Reassessment of Inactivated Poliomyelitis Vaccine, Bilthoven 1980. Develop. Biol. Standard 1981;47:257-9). It was a foreign child (aparalytic) coming from USA. The poliovirus isolated was of type III. Vaccine associated paralytic poliomyelitis has never been diagnosed in Iceland.

## Vaccination against poliomyelitis in Iceland

Vaccination against poliomyelitis began in Iceland in 1956. It began with vaccination campaigns in schools followed by younger children and infants and thereafter all adults up to the age of 40. Three injections were given, the first two 4-8 weeks apart, then a third within a year from the first injection. A 4<sup>th</sup> injection was added four years later when it became evident that 3 injections were not necessarily protective. A further 5<sup>th</sup> injection was added in 1964. Since 1980 six injections have been given, at 6 months, 7 months, 14 months, at the age of 4 and at the age of 9 and finally at the age of 14-15. All individuals are recommended to booster with polio vaccine every 10 years if they visit polio endemic areas,

In Iceland only inactivated vaccine against poliomyelitis has been used from the beginning. The vaccine coverage is high and is estimated to be almost 100%. Comparing sales figures with the usage of the vaccine and interview with the health care personnel responsible for the vaccinations validates the coverage.

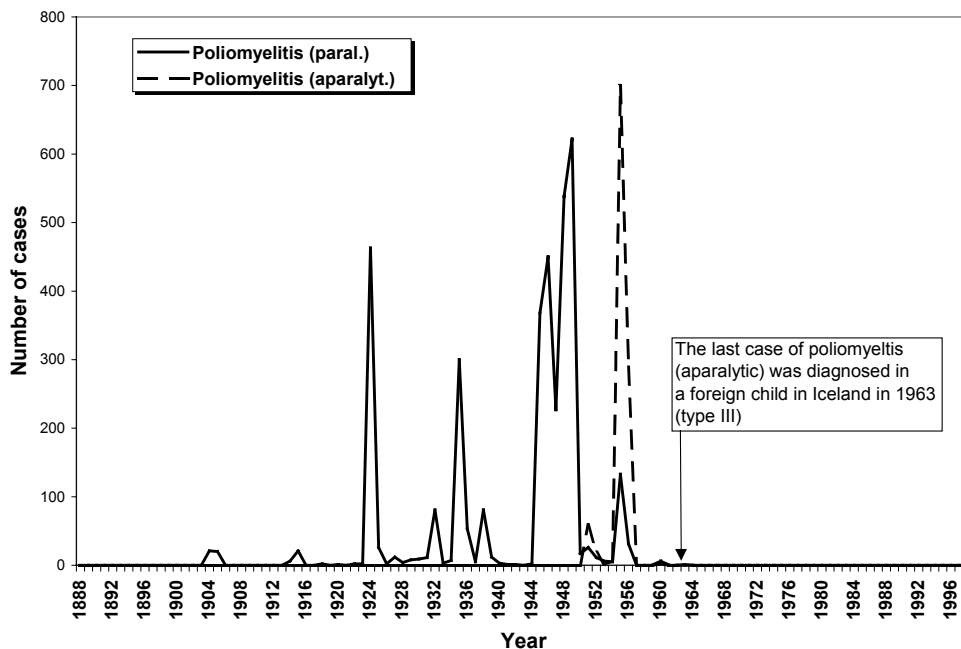


Fig. 3. Poliomyelitis in Iceland.

### Immunity of the Icelandic people to poliomyelitis

Studies on neutralizing antibodies have been carried on at regular intervals during the period 1955 – 1985 (Table 1). After the vaccinations against polio started in 1956 poor response to the vaccines was observed. In 1964 children entering primary school fully vaccinated 4 times were tested for the presence of antibodies against all 3 types of poliomyelitis. Only 25% had antibodies against all 3 types. Subsequent analysis showed a marked difference in the immunogenicity between three different vaccines used at that time resulting in the selection of one vaccine produced by Eli Lilly and the introduction of a fifth vaccine dose. Since January 1967 a Swedish vaccine from Statens Bakteriologiska Laboratorium was used. After the introduction of the Swedish vaccine in Iceland the immune status of the Icelandic population seems to be satisfactory. Since 1989 a Dutch polio vaccine has been used in Iceland.

**Table 1. Studies on neutralizing antibodies to all 3 types of polioviruses in Iceland**

Samples taken before the last polioepidemic in Iceland in 1955

Year 1955	Antibodies against type I			Antibodies against type II			Antibodies against type III		
Age (years)	Pos	N tested	% pos	Pos	N tested	% pos	Pos	N tested	% pos
3-8	0	13	0	3	12	25	11	13	85
10-13	12	14	86	5	14	36	9	14	64

Samples taken prior to the vaccination campaign in the fall of 1956

Year 1956	Antibodies against type I			Antibodies against type II			Antibodies against type III		
Age (years)	Pos	N tested	% pos	Pos	N tested	% pos	Pos	N tested	% pos
< 10 years	77	207	37	69	214	32	108	212	51

Samples taken after four doses of poliovaccines

Year 1964	Antibodies against type I			Antibodies against type II			Antibodies against type III		
Age (years)	Pos	N tested	% pos	Pos	N tested	% pos	Pos	N tested	% pos
6-7	39	99	39	59	99	60	52	99	53

Samples taken after four doses of poliovaccines

Year 1985	Antibodies against type I			Antibodies against type II			Antibodies against type III		
Age group	Pos	N tested	% pos	Pos	N tested	% pos	Pos	N tested	% pos
< 10 years	42	42	100	42	42	100	41	42	98

## The surveillance system in Iceland

Poliomyelitis is a notifiable disease in Iceland. Clinical and laboratory confirmed case should be reported. The health care system in Iceland is of high international standard. If a case of poliomyelitis is detected it would not go unrecognised.

A case of acute flaccid paralysis (AFP) is referred to hospital care and is assessed by a neurologist. AFP of other reasons than polio is not notifiable in Iceland. A recent study on spinal muscular atrophy in children over a period of 15 years from 1982 – 1996 found 9 children with the disease indicating that 1 of 7287 children born will develop the disease (Ludvigsson P, Olafsson E, Hauser WA. Spinal muscular atrophy. Incidence in Iceland 1982-1996, Neuroepidemiol. In press). When conducting the study the authors found no cases compatible with poliomyelitis.

Enterovirus isolations are performed at the Dept. of Virology, National University Hospital in Reykjavik. It is the only virological laboratory in the country and covers the whole population. Approximately 170 stool samples are studied each year and 150 CSF specimens. Enteroviruses other than polioviruses are detected in approximately 15% of the stool samples.

## Conclusion

It can be safely said that no cases of paralytic poliomyelitis have occurred in Iceland since 1960, almost 40 years ago. The evidence is that poliovirus circulation was interrupted only few years after the vaccination was started in 1956 in spite of poorly immunogenic early vaccines. Since then the hygienic standard and the vaccines have improved and the vaccine coverage is almost 100%.

## Appendix II

### ***The sixth meeting of the European Commission for the Certification of Eradication of Poliomyelitis***

*The Vienna International Center, Austria, 22-24 February 1999*

The sixth meeting of the European Commission for the Certification of Eradication of Poliomyelitis was held with the second meeting to consider the National Committee reports. Countries being reviewed were mainly from the Nordic and Baltic parts of the region. The meeting was held at the Vienna International Center, Austria, 22-24 February 1999. The Chairman was Sir Joseph Smith, the secretary was Dr George Oblapenko; Dr David Salisbury was rapporteur. The Commission made general comments on country reports. The comments on the Icelandic National Documentation for Certification of Poliomyelitis Eradication, Preliminary report, February 1999 were:

" The last case of indigenous poliomyelitis was reported to occur in 1960 and the last reported imported case was in 1963. Suspected polio is statutorily notifiable. The case for polio elimination was therefore made on the absence of reports of polio and the available enterovirus surveillance. Approximately 170 fecal samples are investigated each year and 150 CSF samples. This represents a testing rate of one per 1,500 population. Approximately 15% are positive for non-polio enteroviruses. Although there is no formal AFP surveillance, between 1982-96, a study was undertaken on childhood spinal muscular atrophy (motor neuron disease). Nine cases were found and none was considered to be polio compatible.

***The Commission felt that the Iceland data was comprehensive and supported the belief that wild poliovirus was absent. The Commission needs to be assured that the enterovirus laboratories undertake quality assurance procedures, possibly in conjunction with KTL, Finland. The Commission sought reassurance that should there be an importation, and then appropriate interventions would follow immediately. Such assurance was given and will be included into an updated report."***