MULTIPURPOSE SEROLOGICAL SURVEY – ITS PHILOSOPHY AND OBJECTIVES IN THE CZECH REPUBLIC

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INTRODUCTION

Multipurpose serological surveys have been performed in the Czech Republic since 1960, and have been in terms of their results without parallel anywhere in the world. They provide irreplaceable information about the immunity status of the population and basic background data for important decisions regarding changes of existing vaccination programs.

Serological surveys are team studies, involving the work of epidemiologists and statisticians in the organization and selection of suitable groups of people, clinical staff for the blood sample collections, laboratory staff for the examination and testing of the material collected and epidemiologists and statisticians again for the evaluation of the laboratory results. The latest multipurpose serological survey was conducted in 1996 and the results thereof were published as the Final Report on IGA MZ ČR Grant (Registration number 3482-2,OK:08) [*Závěrečná zpráva o řešení grantu IGA MZ ČR (registrační číslo 3482-2,OK:08)*] in *Zprávy Centra epidemiologie a mikrobiologie,* volume 7, March 1998, Supplement 1 (ISSN 1211-7358). The presented multipurpose serological survey was designed in accordance with the requirements of the 16 member countries of the European Union in the ESEN and ESEN 2 (European Seroepidemiological Network) projects.

The objective of the presented multipurpose serological survey conducted and based on examination of a representative population sample, wherein blood samples were taken from a total of 3,500 persons in the age groups from 1 to 64 years in all regions of the Czech Republic during the year 2001 was to obtain information about the prevalence of antibodies against infectious agents causing vaccine preventable diseases, for which vaccination programs are available and implemented in the Czech Republic (diphtheria, tetanus, pertussis and parapertussis, *Haemophilus influenzae b,* poliomyelitis, measles, rubella, mumps, and viral hepatitis B), and to compare this information with the results of previous serological surveys. In addition, the project included examination of antibodies against viral hepatitis A and C and anti-meningococcal antibodies.

The importance of the project is great – the information obtained confirms the efficacy of the vaccination performed, tracks the dynamics of the antibody levels against the individual infectious agents in the respective age groups and becomes a reliable source for justifying necessary interventions into the vaccination schemes.

The presented results of the multipurpose serological survey will enable the evaluation of changes in the levels of antibodies throughout the years and the estimation of the length of the protective effects of the vaccination, identification of failures, if any, during the vaccination (quality of the vaccine, failures during the transportation and storage, low % of vaccinated, and others) and will provide background information for the monitoring of the vaccination programs in different age groups and areas.

The results of the presented multipurpose serological survey will be forwarded to the Ministry of Health of the Czech Republic as background information for the monitoring of the vaccination programs and interventions into the vaccination and other antiepidemic measures if required. At the same time, the results will be used in the Center for Epidemiology and Microbiology (CEM) of the National Institute of Public Health for reference and methodical guidance activities in the respective areas.

MATERIALS AND METHODS

A total of 3,500 sera samples were collected during the year 2001 from persons ranging from 1 to 64 years chosen as a result of random selection in cooperation with regional and district hygiene

Table 1. *Planned distribution according to age and gender in persons providing blood samples*

Age	Males	Females	Σ	Age	Males	Females	Σ
1	54	54	**108**	16	55	55	**110**
2	54	54	**108**	17	55	55	**110**
3	54	54	**108**	18	55	55	**110**
4	54	54	**108**	19	55	55	**110**
5	54	54	**108**	20	55	55	**110**
6	54	54	**108**	21	55	55	**110**
7	54	54	**108**	22	55	55	**110**
8	54	54	**108**	23	55	55	**110**
9	54	54	**108**	24	55	55	**110**
10	54	54	**108**	25-29	55	55	**110**
11	54	54	**108**	30-34	55	55	**110**
12	54	54	**108**	35-39	55	55	**110**
13	54	54	**108**	40-44	55	55	**110**
14	54	54	**108**	45-49	55	55	**110**
15	54	54	**108**	50-54	55	55	**110**
				55-59	55	55	**110**
				60-64	60	60	**120**

Table 2. Summary of serum samples collected according to age in the respective regions

	Regions														
Age groups	Prague	Central Bohemia	South Bohemia	Plisen	Karlovy Vary	Ústí nad Labem	Liberec	Hradec Králové	Pardubice	Vysočina	South Moravia	Olomouc	Zlin	Moravia-Silesia	Total
1	9	11	4	2	2	10	4	4	5	4	9	4	7	15	90
2	14	11	5	5	1	8	3	6	4	6	15	7	7	12	104
3	12	13	5	9	5	8	3	3	5	6	7	9	6	16	107
4	11	13	3	3	4	8	5	6	7	4	11	5	8	16	104
5	12	11	4	5	1	9	3	6	5	6	10	8	6	12	98
6	13	12	5	6	3	9	5	4	5	6	14	8	7	14	111
7	11	13	6	5	4	9	2	7	5	4	11	5	6	17	105
8	13	12	8	5	2	11	6	5	5	6	12	5	7	15	112
9	11	13	7	6	1	9	4	5	7	6	12	8	6	17	112
10	14	11	7	5	3	8	4	2	5	4	13	4	9	12	101
11	9	14	6	7	2	11	5	10	3	6	10	10	7	18	118
12	16	10	6	5	4	8	4	3	8	7	13	6	6	10	106
13	11	12	7	4	2	11	5	7	4	3	14	4	6	17	107
14	13	12	4	6	2	8	5	5	5	7	11	8	8	15	109
15	10	13	10	4	3	11	5	6	5	6	12	8	5	13	111
16	12	13	8	8	5	7	2	5	5	6	12	6	6	14	109
17	12	10	4	7	3	8	5	6	3	6	11	7	7	13	102
18	13	13	8	6	5	11	4	4	6	6	12	5	5	12	110
19	16	13	6	5	2	8	4	7	3	6	12	10	5	15	112
20	13	9	7	6	1	6	8	6	9	7	12	6	6	8	104
21	12	13	7	6	4	11	4	7	7	3	12	8	6	16	116
22	14	12	9	7	5	9	4	4	4	8	13	5	6	17	117
23	13	11	7	6	4	10	3	5	8	5	10	9	6	12	109
24	14	12	7	4	4	8	3	7	6	7	13	6	4	16	111
25-29	12	13	7	6	4	10	5	7	8	6	12	8	8	14	120
30-34	14	12	8	6	4	8	4	6	4	6	12	6	6	14	110
35-39	13	13	6	6	4	9	4	6	7	6	10	8	6	13	111
40-44	13	12	8	6	2	11	6	6	8	6	13	7	6	13	117
45-49	14	12	6	6	2	8	7	6	5	3	13	8	6	14	110
50-54	12	12	8	6	6	10	5	6	5	7	13	6	6	14	116
55-59	12	13	5	6	2	10	5	6	6	6	13	8	7	14	113
60-64	14	12	9	6	4	12	8	6	6	6	11	8	8	15	125
Total	402	386	207	180	100	294	144	179	178	181	378	220	205	453	3,507

(sanitary) offices and with practitioners for adults, adolescents and children in the age categories in all 14 regions (Table 1) of the Czech Republic.

A summary of sera collected in the respective regions of the Czech Republic according to age and sex is provided in Table 2.

Collection of blood samples in the Czech Republic were made by 175 physicians, of which 81 were practitioners for adults and 94 practitioners for adolescents and children. Numbers of physicians and numbers of blood samples to be taken were determined based on the area of the respective regions. Blood samples were taken from healthy individuals, i.e., from those not suffering from any fever and showing no signs of immunodeficiency. Every blood sample taken was coded according to region, district, physician and patient. This coding has provided for a relevant inspection of quality and quantity of the blood samples taken.

Each physician was provided with a Table showing a breakdown of the blood samples to be taken by gender and age of the persons providing the blood sample. In seven cases, the age of the persons providing the blood sample differed from the required interval (9 months in two cases, 65 years in four cases, and 66 years in one case). As the differences in the age were so negligible, the sera were kept in the study group. In addition, the physicians were instructed about the method of blood sample collection and coding.

Table 3. Number of physicians, number and coding of blood samples collections

Region code	Region Name	District code	Physician's code	Patient's code	Number of blood collections	Number of physicians - pediatricians and physicians for adults
11	Prague	A1-A0	001-020	01-20	400	20 (9+11)
21	Central Bohemia	BE → RA	021-039	01-20	380	19 (9+10)
31	South Bohemia	CB → TA	040-050	01-20	220	11 (5+6)
32	Pilsen	DO → TC	051-059	01-20	180	9 (4+5)
41	Karlovy Vary	CH → SO	060-064	01-20	100	5 (2+3)
42	Ustí nad Labem	CV → UL	065-079	01-20	300	15 (7+8)
51	Liberec	CL → SE	080-086	01-20	140	7 (3+4)
52	Hradec Králové	HK → UO	087-095	01-20	180	9 (4+5)
53	Pardubice	CR → SY	096-104	01-20	180	9 (4+5)
61	Vysočina	HB → ZR	105-113	01-20	180	9 (4+5)
62	South Moravia	BK → ZN	114-132	01-20	380	19 (9+10)
71	Olomouc	JE → SU	133-143	01-20	220	11 (5+6)
72	Zlín	KM → ZL	144-153	01-20	200	10 (5+5)
81	Moravai-Silesia	BR → OV	154-175	01-20	440	22 (11+11)
	14 regions of the Czech Republic		175	01-20	3,500	175 (81+94)

Any blood sample collection was recorded in the registration card, which contained essential epidemiological data and along with the blood sample, formed an integral part of the blood sample collection.

Every person from whom a blood sample was taken has provided his/her written consent. One copy of the informed consent form was filled in the physician's office, while the other copy was retained by the person providing the blood sample.

The personnel of field laboratories was provided with the instructions for proper processing of the blood samples taken.

The physicians were remunerated for the blood sample collections based on contractual basis.

The Serum Bank of the Centre for Epidemiology and Microbiology - CEM has prepared healthcare materials necessary for serological surveys. These materials were distributed to the physicians through the regional hygiene centers: Sardstedt blood sample collection kits, needles, syringes for single use, disinfecting agents, sticking plasters and patches. Laboratories were supplied with centrifugation tubes, pasteure pipettes, gloves, plastic bags, elastic bands, and sticking plaster.

Laboratories were informed about the methods for the preparation (double centrifugation) and storage of sera.

The blood samples collection proceeded from September 17 till October 5, 2001. Collection of the sera samples from physicians' offices was ensured by the relevant region public health authorities. There was no delay in the time schedule for the blood sample collection.

The sera were registered in the Serum Bank of the CEM (only 5 regions completed collections in all districts. The data required were checked for completeness, the sera were aliquotted (1 aliquot was stored in the Serum Bank) and respective reference laboratories received aliquots according to their requirements. The placing of the serum in small tubes provided for the individual labs proceeded in accordance with the determined statistical schedule.