The timely involvement of Biobank Pilsen (Czech Republic) in the covid-19 pandemic

Judita Kinkorová, Václav Šimánek, Ondřej Topolčan, Marie Karliková, Radek Kučera

University Hospital in Pilsen, Faculty of Medicine in Pilsen, Charles University, Czech Republic

Background

The **COVID – 19 pandemic** represents the greatest medical and socioeconomic challenge of our time. The pandemic affected all health care systems worldwide and the Czech Republic was one of successful European countries during the first wave in early spring 2020. The epidemiological data of covid-19 deaths were comparing with influenza deaths data from 2018, 2019 significantly lower. Currently the Czech Republic is facing the third wave with much worse course than in spring 2020.
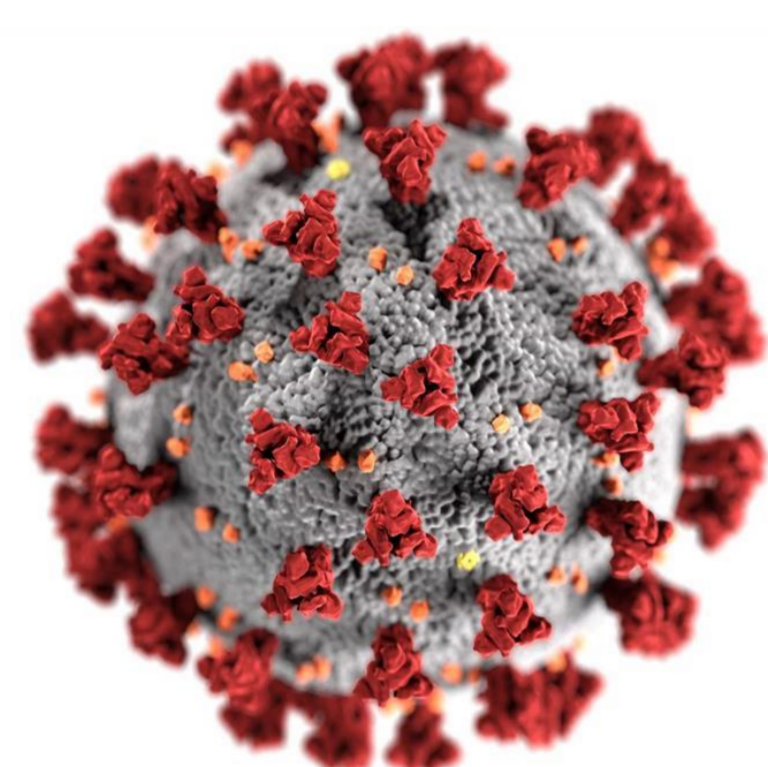
Vitamin D levels based on season and supplementation

Months	Supplementation	N	25 OH vitamin D nmol/L			
			< 30	30- 50	50 - 75	> 75
July - September	No	1500	2 %	11%	52 %	36
February - April	Yes	200	0 %	8 %	12 %	80
February - April	No	200	28 %	26 %	26 %	20

Trendový profil osob s laboratorně prokázaným onemocněním COVID-19
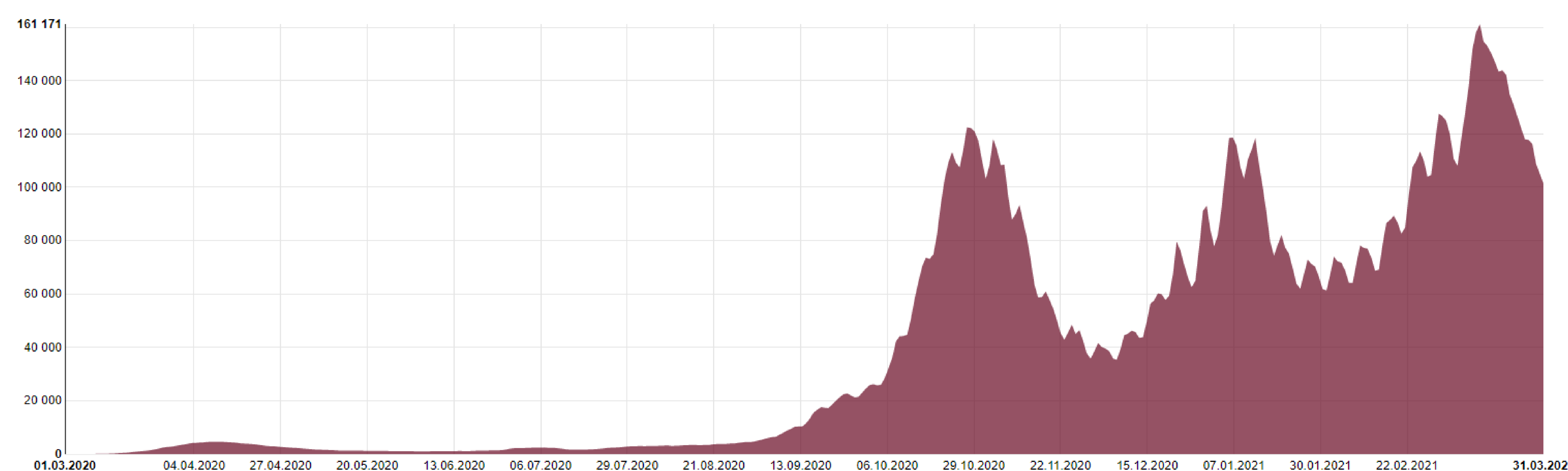
Methods and Results

University Hospital in Pilsen is the key health-care institution in the region and the pandemic completely changed the functioning of the whole hospital. Laboratory of immunochemical diagnostics and Biobank were among the departments which have flexibly responded to the novel situation. While clinical departments were put into the emergency regime, the laboratory and Biobank started specimen collections related to covid-19 and probing of antibody and later antigen tests from different manufacturers.

Vitamin D levels and SARS-CoV-2 prognosis

	< 30 nmol / L	30- 50 nmol / L	50 - 75 nmol / L	> 75 nmol / L
No of patients	79	113	188	288
Age average	71,9 ± 13,8	62,9 ± 14,7	56,6 ± 12,6	46,6 ± 12,6
Comorbidity %	80,0	63,8	18.8	18.8
Death %	80,9	67.8	39.1	9.1
Treated %	19.1	22.2	60,9	91,9

IgG Ab SARS Individual chagnes 0 – 10 months

Days After RT- PCR +	Ig M Ab			Ig G Ab		
	Median	Minimum	Maximum	Median	Minimum	Maximum
3	0,8	0,2	2	0	0	0
5	3	0,8	8	0	0	0
10	30	5	59	3	1	16
15	45	8	92	16	4	36
20	61	2	111	31	2	56
25	48	1	96	34	11	24
30	28	1	49	42	9	78

IgG Ab SARS Individual chagnes 0 – 10 months
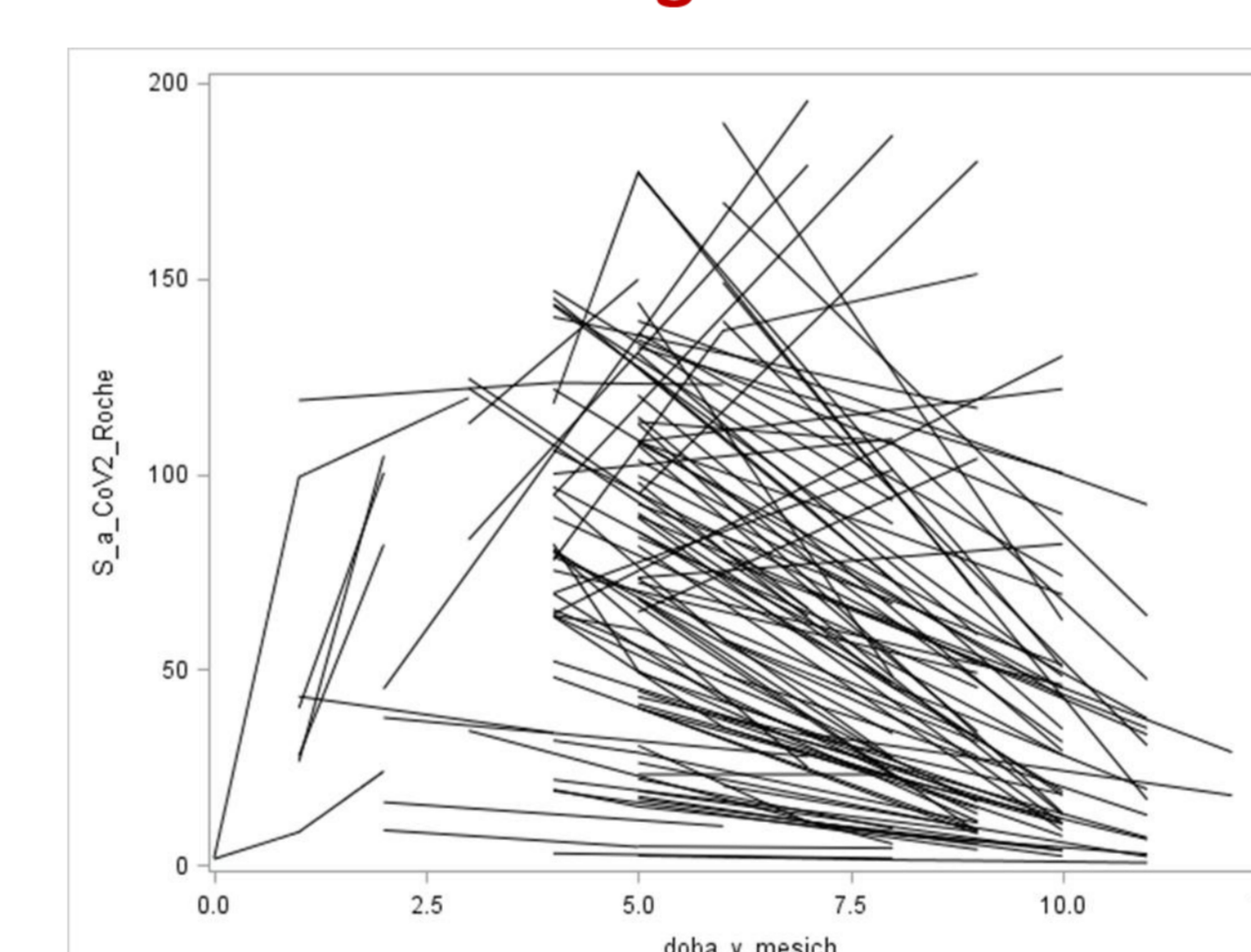
Antibody IgG levels chagnes 0 -10 weeks after 1.dose vaccination

Antibody IgG SARS – CoV- 2					
weeks after 1.dose vaccination		Mean	SD	Median	Minimum	Maximum
0	10	58.0	36.6	51.0	21.2	120.9
1	10	429.1	203.3	391.1	210.9	729.0
4	10	319.9	150.3	310.0	119.2	592.0
7	10	199.4	91.1	179.7	78.7	329.8
10	10	100.7	48.5	98.1	42.6	182.7

Samples related to covid-19 (blood plasma and serum) as well as associated data have been collected, according to standard biobank collecting procedures, and were used partially for internal research purposes. From March to May, all blood sample leftovers of the diagnostics routine were stored in biobank as -Population samples COVID-19- group (approx. 3.800 specimens). From June two sample collections were organized: 1/ University Hospital employees (approx. 1500 subjects), 2/ COVID-19 positive subjects – samples collected 4 weeks after the healing. Antibodies Anti-SARS-CoV-2 and 25OH vitamin D were measured in these samples and repeated tests on these subjects are planned after 3 and 6 months.

Conclusions

Low serum 25-OHD was associated with higher **COVID-19 mortality** and the association between low serum 25-OHD, and COVID-19 **infection was affected by age**. Older patients with **comorbidities** such as obesity, diabetes, cardiovascular disease, hypertension, heart failure showed higher mortality.

It seems that vitamin **D3 supplementation would be useful in the treatment of COVID-19 infection**, in preventing a more severe symptomatology and/or in reducing the presence of the virus in the upper respiratory tract and making the patients less infectious (justifying negative PCR in people with higher25(OH)D). Randomized controlled trials and large population studies should follow to evaluate these recommendations and to confirm our preliminary observations and hypothesis.

For **decision-making and vaccine development** it is crucial to understand how long immunity against SARS-CoV-2 persists in **infected individuals** and whether antibodies produced in response to a natural infection provide **protective immunity**, which may prevent reinfection with SARS-CoV-2.

IgG and IgM occurs about 2–3 weeks after disease onset and IgM levels drop significantly earlier than IgG titers. However, it is unclear which antibody type (IgG or IgM) performs best in the epidemiologic identification of convalescent patients.

Covid -19 related activities were coordinated at national level and at the international -level with **BBMRI-ERIC** (Biobanking and BioMolecular resources Research Infrastructure - European Research Infrastructure Consortium).