Chapter 12b

TBE in Switzerland and Liechtenstein

Daniel Desgrandchamps and Klara M. Posfay-Barbe

History and Current Situation

The first serological reports of tick-borne encephalitis (TBE) in Switzerland date back to the early 1970s [T. Krech. Dissertation, University of Berne, 1980]. Surveillance started in 1984, and TBE became a notifiable disease in 1988. Most cases are reported between April and October with a tick bite exposure below an altitude of 1500-2000 meters.[1,2]

Tick-borne encephalitis virus (TBEV) has not been identified in ticks from all regions of the country. This explains why human cases are mainly found in endemic but not in all regions. Most cases occur in the northeast of the country, but in recent years, new endemic regions have been detected in western (Vaud) and south-western Switzerland (Valais), which suggests that TBE has become endemic almost in the entire country.

In 2013, a procedure allowing for the definition of regions with a local TBE vaccination recommendation had been adopted for Switzerland and Liechtenstein.[3] Data from cases notified over the last 10 years ("high risk areas", Fig. 3a) were combined with data from the historical map of Swiss endemic regions and "natural clusters". The resulting Swiss map was used until 2018 for the definition of regions where TBE vaccination is recommended for exposed people (Figure 3b).

However, in view of the increasing numbers of reported TBE cases in recent years, Swiss and Liechtenstein health authorities decided in 2019 to consider the entire countries – except for the cantons of Geneva and Ticino – as an at-risk area in which TBE vaccination is recommended for all individuals with possible exposure (both as residents or as visitors)[2], see Figure 3c.

Currently, vaccination is generally recommended and reimbursed by health insurance for individuals older than 6 years of age living in or visiting endemic regions. In children aged 1-5 years, the indication shall be based on individual considerations. Unlike in other countries and in contrast to the label, a booster dose is recommended every 10 years only[3].

Between 2000 and 2018, the Federal Office of Public Health has received between 52 annual reports of TBE cases in 2002 (incidence 0.7/100,000), and 376 cases in 2018 (incidence 4.4/100,000). The number of cases fluctuated considerably from year to year; the highest average value was 24.8/100,000 (2018) in the canton of Uri in central Switzerland. So far, only 10 out of 26 cantons plus Liechtenstein have notified at least 1 patient every year.[4]

As elsewhere in Europe, the proportion of 'mild cases' is lower and the number of more serious cases higher with increasing age. However, more serious disease pictures like meningoencephalitis have also been reported in children below the age of 6 years over the last years (E. Altpeter, FOPH, personal communication). Less than half (45%) of symptomatic patients have reported a tick bite within 4 weeks of onset.[5] Less than 2% of cases experienced tick bites outside of Switzerland.

Approximately 80% of all symptomatic patients are hospitalized.[1] The mean duration for hospitalization was 9 days (interquartile range 5–11 days), and duration increased linearly with age (5 days in children less than 14 years old to 14.6 days for patients older than 70 years).[5]

Overview of TBE in Switzerland

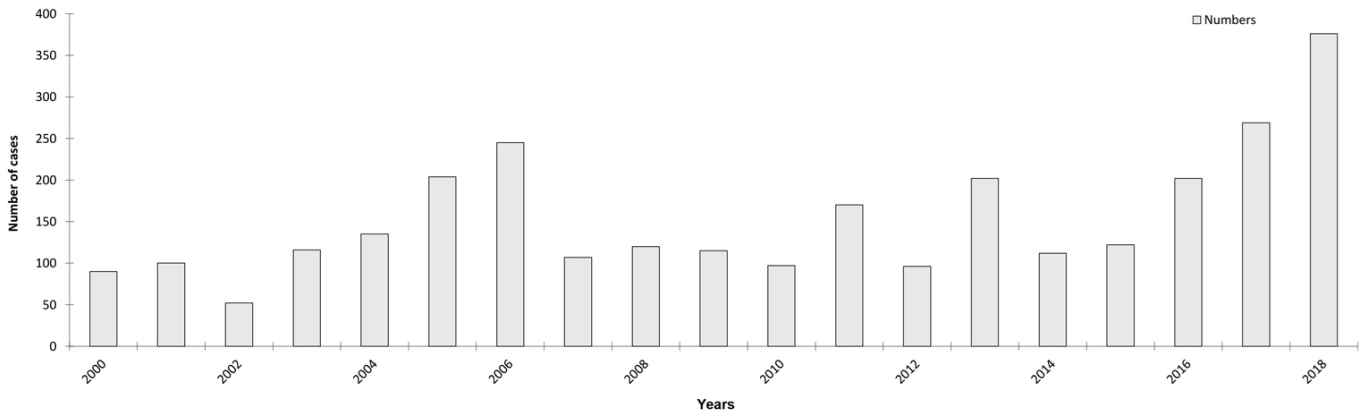
Table 1: Virus, vector, transmission of TBE in Switzerland

Viral subtypes, distribution	European subtype; 97–98.4% similar to the reference Neudoerfl strain, strain Genbank = U27495; mostly: strain NET-BE7, HQ883372 & NETBE8 (HM450136, HM450137, HM450138, HM450140, HM450141)[6,7]
Reservoir animals	Small mammals such as rodents, birds[6,7]
Infected tick species (%)	*Ixodes ricinus*. 1.6–9.9% in areas <2000 meters altitude[6,8]
Dairy product transmission	Not documented

Table 2: TBE reporting and vaccine prevention in Switzerland

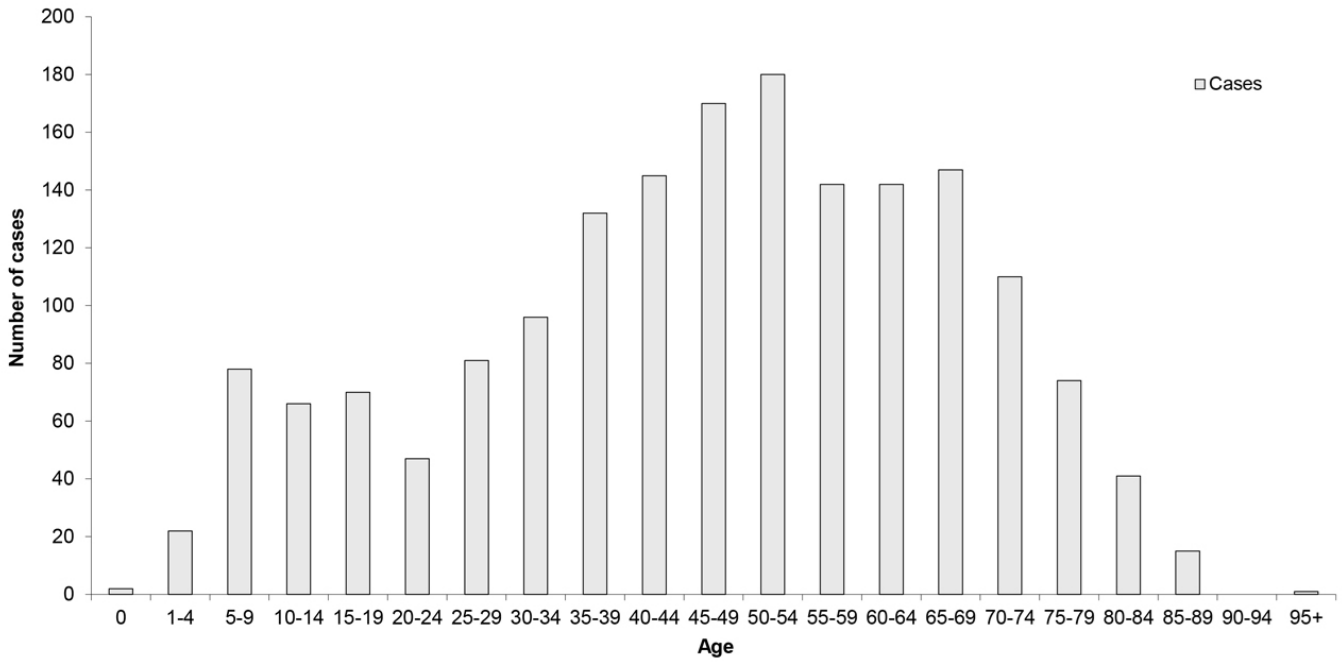
Mandatory TBE reporting	Notifiable disease since 1988 Tick bites and Lyme borreliosis have been reported via a sentinel group (general practitioners and pediatricians in the entire country) since 2008[5,9]			
Categorization[5]	Case classification	Laboratory criteria		Clinical criteria
	Not a case	Positive IgM serology		No ILI & no neurological symptoms
	Possible case	a)	Positive IgM serology	ILI or non-specific neurological signs & symptoms
		b)	Positive IgM + positive IgG serology*	Any
	Probable case	a)	Positive IgM serology	Meningitis, meningoencephalitis, encephalomyelitis or pareses
		b)	Positive IgM + positive IgG serology*	ILI or non-specific neurological signs or symptoms
	Confirmed case	a)	Positive IgM + positive IgG serology*	Meningitis, meningoencephalitis, encephalomyelitis, or pareses
		b)	TBE-RNA detection by PCR	Meningitis, meningoencephalitis, encephalomyelitis, or pareses
IgG, immunoglobulin; IgG, immunoglobulin; ILI, influenza-like illness; PCR, polymerase chain reaction *Or anti-TBE IgG serum antibody seroconversion or ≥4-fold rise in anti-TBE IgG serum antibodies				
Special clinical features	No Swiss data			
	% with sequelae: 25%; mortality: 1%			
Available vaccines[10]	Encepur N® (Novartis/GSK); FSME-Immun® (Baxter/Pfizer Number of doses sold: not available			
Vaccination recommendations and reimbursement[10]	Recommendations and reimbursement for vaccination in 2006			
Vaccine uptake by age group/risk group/general population[11]	**Average national vaccination uptake (3 doses), 2014-16:** 8 years old: 22-31% 16 years old: 33-45% **High-risk area** (canton of Thurgau): 8 years old: 40-53% 16 years old: 64-75%			
Name, address/ website of TBE National Reference Center	National Reference Center for Tick-borne Diseases, SPIEZ LABORATORY is a division of the Federal Office for Civil Protection LABOR SPIEZ Austrasse 3700 SPIEZ - Switzerland https://www.labor-spiez.ch/de/die/bio/dediebionrz.htm nrzk@babs.admin.ch			

Figure 1: Burden of TBE in Switzerland 2000-2018[2]



Source Data: Appendix—Figure 1

Figure 2: Age and gender distribution of all cases of TBE (possible, probable, and confirmed cases) in Switzerland



Source Data: Appendix—Figure 2

Figure 3a: High risk areas[3]
(local clusters of TBE notifications over the last 10 years, as per March of 2019).

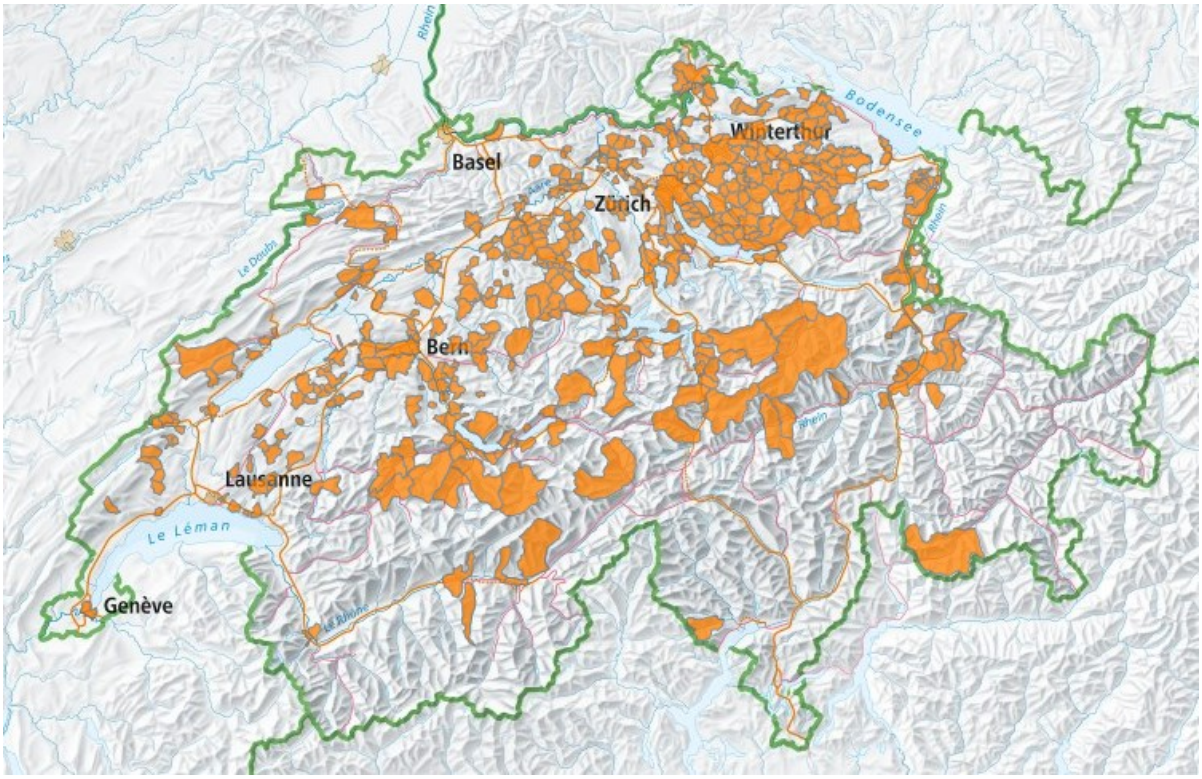


Figure 3b: Defined risk areas in Switzerland[3], where vaccination was recommended for exposed people until end of 2018.

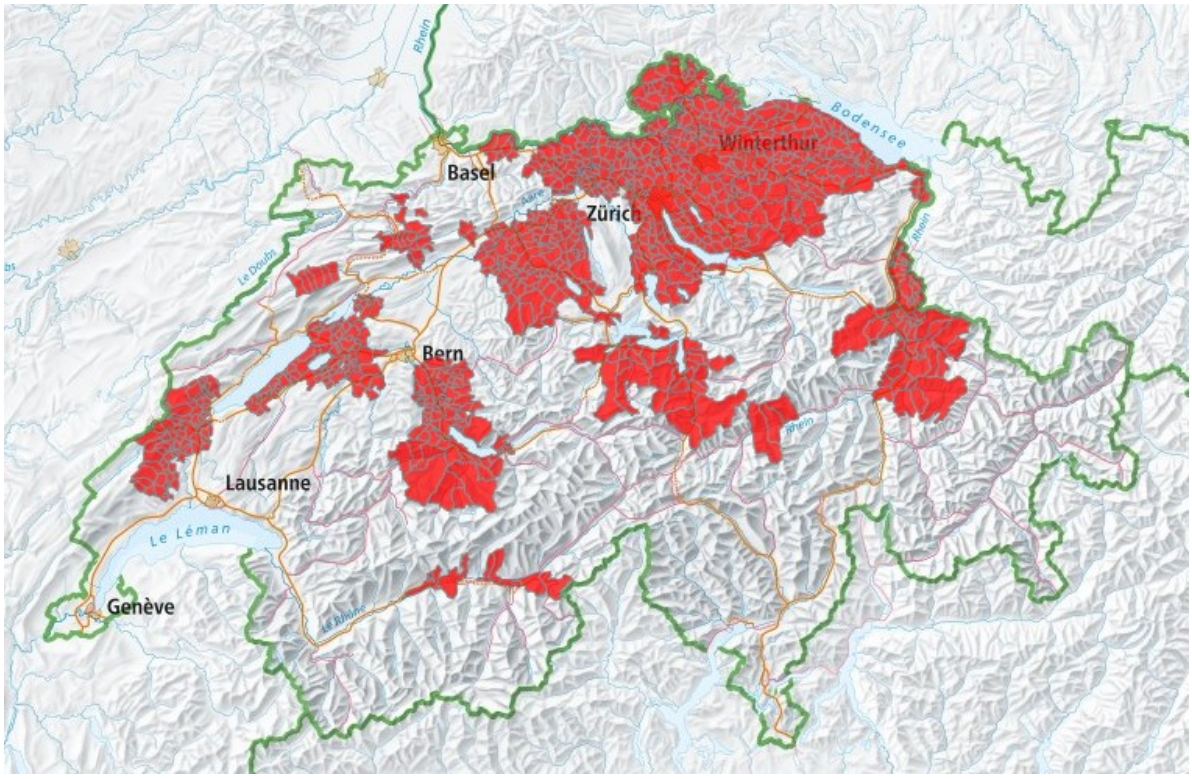
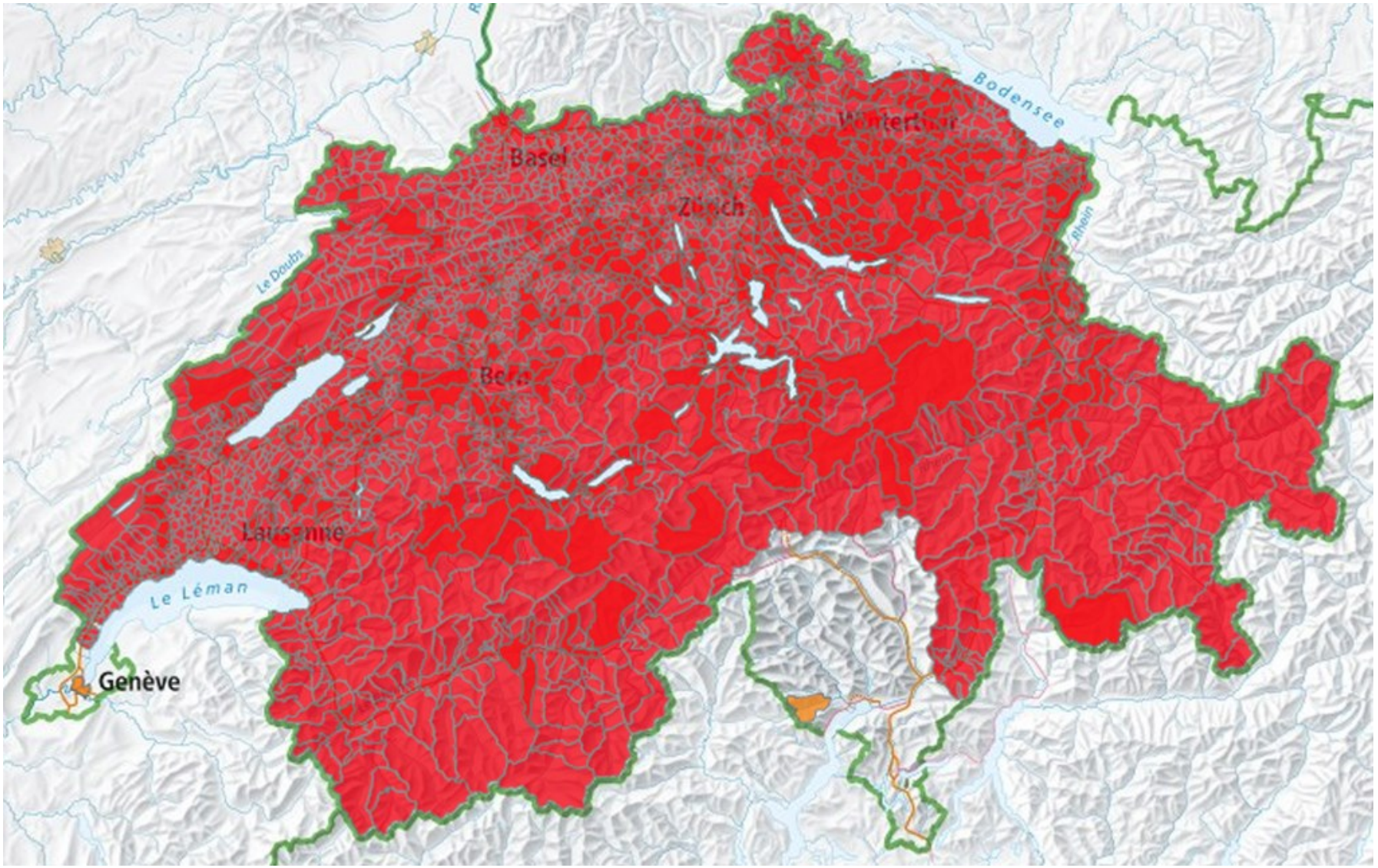


Figure 3c: Extended risk areas with recommended TBE vaccination for all exposed individuals (residents and visitors) as per March 2019[2]



Latest update: https://map.geo.admin.ch/?lang=de&topic=ech&bgLayer=ch.swisstopo.pixelkarte-farbe&layers=ch.swisstopo.zeitreihen,ch.bfs.gebaeude_wohnungs_register,ch.bav.haltestellen-oev,ch.swisstopo.swisstlm3d-wanderwege,ch.bag.zecken-fsme-faelle,ch.bag.zecken-fsme-impfung&layers_visibility=false,false,false,false,true,true&layers_timestamp=18641231,,,,,&layers_opacity=1,1,1,1,0.75,0.75&E=2689361.80&N=1191555.10&zoom=1

Appendix

Source data[4]: Figure 1

Year	Number of cases	Incidence/10^5
2000	90	1.24
2001	100	1.37
2002	52	0.70
2003	116	1.56
2004	135	1.81
2005	204	2.72
2006	245	3.24
2007	107	1.40
2008	120	1.55
2009	115	1.47
2010	97	1.22
2011	170	2.12
2012	96	1.18
2013	202	2.47
2014	112	1.35
2015	122	1.45
2016	202	2.39
2017	269	3.16
2018	376	4.41

Source data 2009-2018[4]: Figure 2

Age group (years)	Cases	Incidence/10^5
0	2	0.233
1-4	22	0.647
5-9	78	1.896
10-14	66	1.609
15-19	70	1.585
20-24	47	0.951
25-29	81	1.461
30-34	96	1.639
35-39	132	2.262
40-44	145	2.386
45-49	170	2.605
50-54	180	2.803
55-59	142	2.558
60-64	142	2.981
65-69	147	3.453
70-74	110	3.027
75-79	74	2.655
80-84	41	1.955
85-89	15	1.163
90-94	0	0
95+	1	0.625

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Contact: daniel@desgrandchamps.ch

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