

Table S1

Desirable strain characteristics	GAS M75 611024
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A definite but uncommon contemporary cause of symptomatic pharyngitis

- Isolated in 2011 from the throat of a child with pharyngitis in Melbourne(1)
- Pre-existing immunity in adults is unknown (no correlate of protection)
- *emm75* <5% of global GAS isolates (all sites and settings)(2)
- *emm75* strains in selected GAS pharyngitis series since 2000

Location	n	<i>emm75</i>
Fiji(3)	85	1.2%
Northern Territory, Australia(4)	635; 235 pharyngeal isolates	1.3%
Denmark(5)	352	2.5%
Chile(6)	80	2.5%
Mali(7)	396	2.5%
New Zealand(8)	349	2.6%
Greece(9)	1282; 1080 pharyngeal isolates	2.7%
Japan(10)	332	2.7%
France(11)	585	2.9%
Canada(12)	1434	3.1%
Ethiopia(13)	155	3.2%
USA(12)	7040	4.7%
Cape Town, South Africa(14)	157	7.6%
Germany(15)	216	7.9%
Tunisia(16)	43	32.5%

Should cause skin infection

- E pattern ‘generalist’ (throat & skin infections)(17)
- Cluster E6 - linked phylogenetically to D pattern skin isolates(17, 18)

An uncommon cause of invasive GAS disease and immunological sequelae

- *emm75* strains very rarely associated with ARF/RHD or APSGN(19-26)
- *emm75* strains in selected invasive GAS series since 2000

Location	n	<i>emm75</i>
Portugal (27)	160	0
Northern Territory, Australia (28)	82	0
France (11)	125	0.8%
Alberta, Canada (29)	3105	1%
Finland (30)	1122	1.2%
Kilifi, Kenya (31)	357	1.4%
Denmark (5)	201	1.5%
Ireland (32)	473	1.5%
Fiji (33)	55	1.8%
Sydney, Australia (34)	55	1.8%
Scotland (35)	357	2%
USA (36, 37)*	17,002	2.4%
Norway (38)	756	2.1%
Japan (10)	74	4.1%
Thailand (39)	234	5.1%

*CDC Active Bacterial Core surveillance 2000-2016 (Chris A. Van Beneden, Personal Communication, September 11th, 2018)

Should have predictable and limited virulence, and be suitable for use in animal models

- *covR/S* virulence regulator wildtype (non-mutant)
- Does not bind plasminogen and fibrinogen(18)
- *emm75* strains have been used in murine models of nasopharyngitis and invasive disease, and have been successfully transformed for bioluminescence(40)

Should have limited antibiotic resistance

- See main text

The challenge strain should possess a wide array of candidate vaccine antigens

- See main text

ARF: acute rheumatic fever, APSGN: acute post-streptococcal glomerulonephritis, GAS: group A *Streptococcus*; RHD: rheumatic heart disease

References for Supplemental Table S1

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