



Letter from France

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Whether Carl Flügge is a medical hero is no longer debated today (Fig. 1). However, he died in 1932 without a lavish 'pantheon ceremony'. Dr Flügge discovered and demonstrated how droplets released when coughing, sneezing or just chatting are a vehicle for airborne contagious microbes. As a Koch's Fellow, he succeeded in profoundly changing the way tuberculosis (TB) was and is managed in non-endemic countries. The promotion of both patients and healthcare workers' protection was standardized and promoted which dramatically decreased post-surgical infections. In the country where the BCG (Bacille de Calmette et Guérin) vaccine was developed, the control of TB is currently organized through regional centres entitled 'Centre de Lutte Anti-Tuberculeuse' (CLAT), all connected to a national reference centre. This network efficiently keeps the epidemic under control by patient referral and promotion of prevention and screening in maternity clinics and specific communities. These centres secure patients' follow-up and high levels of compliance to quarantine, social distancing, face mask use and adherence to TB medications. Furthermore, CLAT are dedicated to contact tracing around each case in concert with the policy maker (ARS, Agence Régionale de Santé) through the enforcement of mandatory individual case reporting. Indeed, delay before insidious symptoms onset are TB features deserving such organization.

It is clear that we did not transpose Flügge's knowledge and this established strategy of TB control to better address coronavirus disease-19 (COVID-19). We definitely should ask why.

The science of face masks and self-protection are key behavioural measures to control airborne infections. These preventive behaviours are not naturally part of our proud Latin traits, which may explain the discrepancies observed in the COVID pandemic outcomes between northern and southern countries of Europe. The weeks of lockdown have contributed to reinforce the messages for self-protection, but teaching needs repetition and straightforward messages should be reinforced again and again.

How should healthcare providers integrate this pre-acquired knowledge?

A snapshot of our healthcare institutions during this pandemic turmoil shows nearly the opposite side of what Dr Flügge may have advised in his time.

Perhaps thinking of it as harmless background noise inherited from the romantic period ('the romantic phthisis'), we forgot about the spread of TB as a white

plague for various reasons. The relatively low incidence of TB, the availability of the efficient 'French vaccine' and the beliefs that treatments are efficient and the national resistance rates quite low contributed to attitudes that air-related spread could be more or less kept aside.

In our hospitals, double-bed rooms and collective air circuits are common in wards. Except in some cases, screening tests are poorly available and patient contact tracking is deemed useful for TB, but difficult to implement.

As chest physicians, we inherited a great deal from the long history of TB control and we can now compare the two pandemics. The main distinction is that severe acute TB is a rare occurrence in our Westernized country nowadays, even in poor areas and specific communities.

The comparison between COVID-19 and TB can be drawn from diagnosis to prevention, when at present immunization is seen as the 'holy grail' for improving COVID-19-related outcomes (Table 1).

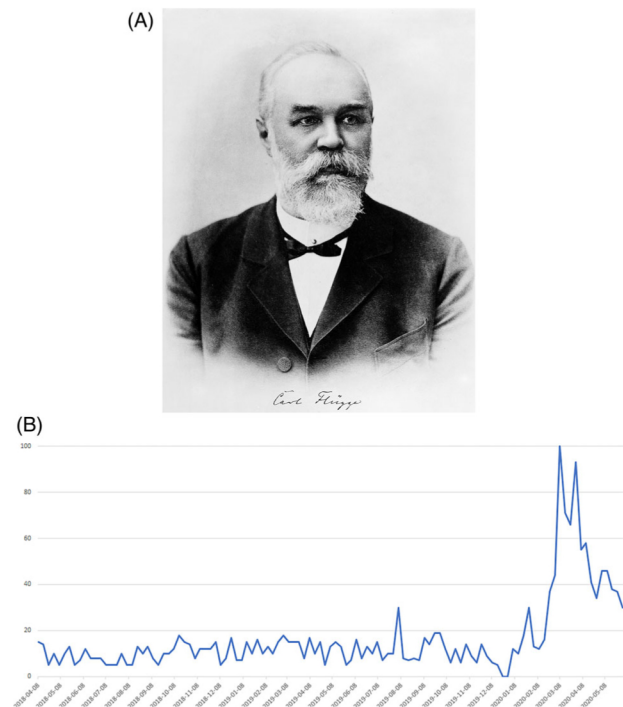


Figure 1 Carl Flügge (Credit: Wellcome Collection. Attribution 4.0 International (CC BY 4.0)) (A); 'Interest' for 'Carl Flügge'. Google search accessed 10 May 2020 (B).

Table 1 Similarities and discrepancies between tuberculosis and COVID-19

	Tuberculosis	COVID-19-related syndrome
Specificity of clinical presentation	Weak	Weak
Course	Sub-acute	Acute
Population	Low constant incidence	High acute outbreak
Deaths	1 500 000 (2018)	283 000 (from the beginning)
Number of active recruiting clinical trials for vaccine	15	48
Pathogen	Mycobacteria	RNA virus
Spread	Air droplets	Air droplets
		Surface contacts
Imaging HRCT for screening	Debated	Debated [†]
Samples for diagnostic test	Sputum	Nasopharyngeal
	BAL	Sputum
	Gastric aspirate	BAL
	Stool	Stool
	Granulomas with necrosis in tissues	
Serum screening	IGRA	In development
Risk factors	Immunosuppressed	Elderly
	Migrants	Obese
	Specific communities	Co-morbid HP, diabetes
		Specific communities
Prevention	BCG vaccine	Masks
	Masks	Case-proven investigation
	Case-proven investigation	Lockdown
	Case-proven reporting	
	Chemoprophylaxis	
	Quarantine	

[†]Hope et al.¹

BAL, broncho-alveolar lavage; BCG, Bacille de Calmette et Guérin; HP, high blood pressure; HRCT, high-resolution computed tomography; IGRA, Interferon Gamma Release Assay.

Rapid point-of-care screening tests and efficient microbiological assays are shared unmet needs for both TB and COVID-19. The indirect assessment of cellular and humoral immunity is not completely established in both diseases. Imaging using high-resolution computed tomography (HRCT) scan, with typical features seen during the COVID pandemic may also be explored for TB in high-income countries, especially to discriminate between active and latent TB infection. Identifying clusters of infections, investigating around a proven case and screening for healthcare workers—the three pillars of the CLAT missions—are the currently recommended strategies accompanying the end of lockdown worldwide.

The future will tell if policy makers can take advantage of the established TB network to limit the spread of COVID-19 and other airborne agents, and to what extent such measures will also impact TB—by far a greater killer in the world. In our institution, COVID-19 funnels were successfully applied in building efficient highways and precluding dissemination of cases throughout the hospital. In this period of epidemic decline, remaining COVID-19 clusters are unsurprisingly linked with already identified regional TB clusters such as squats and all places of precarious collective housing, where

social distancing and barriers are impossible to access or apply. Access to these more precarious populations requires specific know-how, which is perfectly mastered by those responsible for the fight against TB (CLAT) in their activities including contact tracing.

There should be review and clarification of the exact missions and roles these CLAT are given, what clinical and scientific expertise we are relying on and how cost-effective, hygiene-suitable facilities can be implemented in our healthcare system despite limited resources. Given the non-negligible probability of more respiratory infectious pandemics in the future, with increased population, precariousness, climate change, etc.,² a nationwide institutional introspection seems to be a high priority.

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