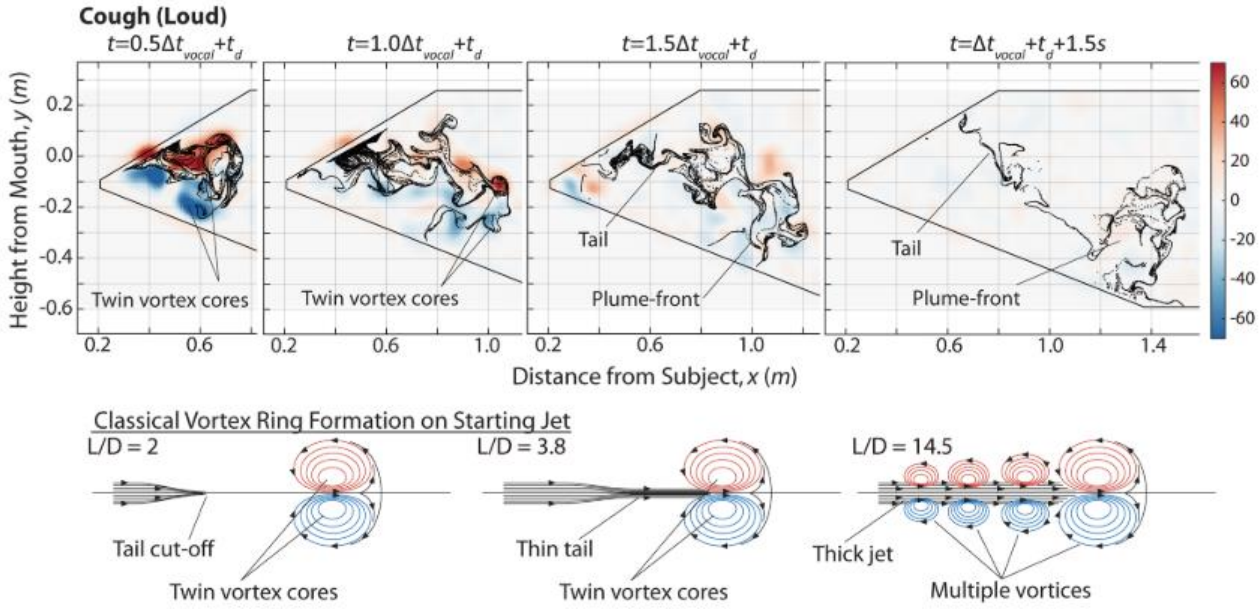

Figure 6. Dispersion dynamics of aerosol particles for a loud cough compared with classical vortex ring formation on starting jet (Δt_{vocal} is the total duration of the subject's cough, td is the instance that the plume enters the measurement domain, stroke ratio L/D where L is the length of ejected fluid and D is ejection diameter) (Tan et al. 2021)

Figure 6 shows, when t=+0.5Δ_{tvocal}, the cough flow first presents a dominant vortex ring similar in structure to the classical impulsively start jet. The vortex ring quickly disintegrated into multiple smaller vortex cores starting at +1.0 Δ_{tvocal}. At +1.5 Δ_{tvocal}, the original vortex ring structure has become indistinguishable. However, the aerosol particles continued to move forward even at +1.5s after cough, and the presence of a trail is an indication of high L/D impulsively started jets. Their results indicate that virus-laden aerosol ejected during coughs remain concentrated within the moving plume-front. A high exposure risk is expected with direct collision in the moving plume-front.

3 CONCLUSIONS

The literature review leads to the following conclusions:

- The airflow characteristic of human cough is normally measured by three techniques, including the Schlieren imaging technique, spirometer and PIV. Each technique has its advantages and disadvantages, and the uncertainties of measuring techniques require further investigation. On the other hand, PVT and CDT are in the order of milliseconds. In order to capture the cough characteristic, it is essential to have high-frequency measurements.
- The cough profile can be described by a gamma-probability distribution function. The characteristic of the profile can be defined by the following parameters: peak flow rate (PFR) or peak velocity (PV); peak velocity time (PVT), and cough duration time (CDT) and cough expired volume (CEV). Large deviations have been shown on PFR, PV, CEV due to subjects' gender, height, age and body mass surface, however, some deviations are due to different measuring techniques.
- Large deviations on flow direction and mouth geometry between different studies and no agreement on how to report these parameters during a cough.