Classifications

**Title**: Impact of face masks on voice radiation

**DOI**: 10.1121/10.0002853

**Classification**: 2

**Abstract**: With the COVID-19 pandemic, the wearing of face masks covering mouth and nose has become ubiquitous all around the world. This study investigates the impact of typical face masks on voice radiation. To analyze the transmission loss caused by masks and the influence of masks on directivity, this study measured the full-spherical voice directivity of a dummy head with a mouth simulator covered with six masks of different types, i.e., medical masks, filtering facepiece respirator masks, and cloth face coverings. The results show a significant frequency-dependent transmission loss, which varies depending on the mask, especially above 2 kHz. Furthermore, the two facepiece respirator masks also significantly affect speech directivity, as determined by the directivity index (DI). Compared to the measurements without a mask, the DI deviates by up to 7 dB at frequencies above 3 kHz. For all other masks, the deviations are below 2 dB in all third-octave frequency bands.

**Title**: Pandemic Dreams: Network Analysis of Dream Content During the COVID-19 Lockdown

**DOI**: 10.3389/fpsyg.2020.573961

**Classification**: 2

**Abstract**: We used crowdsourcing (CS) to examine how COVID-19 lockdown affects the content of dreams and nightmares. The CS took place on the sixth week of the lockdown. Over the course of 1 week, 4,275 respondents (mean age 43, SD = 14 years) assessed their sleep, and 811 reported their dream content. Overall, respondents slept substantially more (54.2%) but reported an average increase of awakenings (28.6%) and nightmares (26%) from the pre-pandemic situation. We transcribed the content of the dreams into word lists and performed unsupervised computational network and cluster analysis of word associations, which suggested 33 dream clusters including 20 bad dream clusters, of which 55% were pandemic-specific (e.g., Disease Management, Disregard of Distancing, Elderly in Trouble). The dream-association networks were more accentuated for those who reported an increase in perceived stress. This CS survey on dream-association networks and pandemic stress introduces novel, collectively shared COVID-19 bad dream contents.

**Title**: Telemedicine for housebound older persons during the Covid-19 pandemic

**DOI**: 10.1016/j.maturitas.2020.06.024

**Classification**: 2

**Abstract**: Targeting older at-risk patients with decision-making algorithms is a priority at a time when hospitals are receiving an influx of Covid-19 patients that may exceed their capacity. Such screening could likely be extended to primary care settings in order to identify older community dwellers with Covid-19, but also those experiencing the adverse consequences of prolonged home confinement. The Centre of Excellence on Longevity of McGill University (Quebec, Canada) designed a short assessment for Montreal's housebound community-dwelling older adults. It acts as the first step in connecting older community dwellers who are housebound during the Covid-19 outbreak to telemedicine.

**Title**: Comparison of SARS-CoV-2 RT-PCR on a high-throughput molecular diagnostic platform and the cobas SARS-CoV-2 test for the diagnostic of COVID-19 on various clinical samples

**DOI**: 10.1093/femspd/ftaa061

**Classification**: 2

**Abstract**: Objectives: In order to cope with the rapid spread of the COVID-19 pandemic, we introduced on our in-house high-throughput molecular diagnostic platform (MDx Platform) a real-time reverse transcriptase PCR (RT-PCR) to detect the SARS-CoV-2 from any clinical specimens. The aim of this study was to compare the RT-PCR results obtain with the MDx Platform and the commercial assay cobas SARS-CoV-2 (Roche) on nasopharyngeal swab and other clinical specimens including sputum, bronchial aspirate, bronchoalveolar lavage and anal swabs.

Methods: Samples received in our laboratory from patients suspected of COVID-19 (n = 262) were tested in parallel with our MDx platform SARS-CoV-2 PCR and with the cobas SARS-CoV-2 test.

Results: The overall agreement between the two tests for all samples tested was 99.24% (260/262), which corresponded to agreements of 100% (178/178) on nasopharyngeal swabs, 95.45% (42/44) on lower respiratory tract specimen with discordant resultS obtained for very high cycle threshold (Ct) value and 100% (40/40) on anorectal swabs. The Ct values for nasopharyngeal swabs displayed an excellent correlation (R2 > 96%) between both tests.

Conclusions: The high agreements between the cobas SARS-CoV-2 test and the MDx platform supports the use of both methods for the diagnostic of COVID-19 on various clinical samples. Very few discrepant results may occur at very low viral load.

**Title**: Comparative study of ANN and Fuzzy classifier for forecasting Electrical activity of Heart to diagnose Covid-19

**DOI**: 10.1016/j.matpr.2020.10.400

**Classification**: 2

**Abstract**: Covid-19 is a dangerous communicable virus which lets down the world economy. Severe respiratory syndrome SARS-COV-2 leads to Corona Virus Disease (COVID-19) and has the capability of transmission through human-to-human and surface-to-human transmission leads the world to catastrophic phase. Computational system based biological signal analysis helps medical officers in handling COVID-19 tasks like ECG monitoring at Intensive care, fatal ventricular fibrillation, etc., This paper is on diagnosing heart dysfunctions such as tachycardia, bradycardia, ventricular fibrillation, cardiac arrhythmia using fuzzy relations and artificial intelligence algorithm. In this study, the heart pulse base signal and features like spectral entropy, largest lyapunov exponent, Poincare plot and detrended fluctuation analysis are extracted and presented for classification purpose. The RR intervals of Poincare plot summarize RR time series obtained from an ECG in one picture, and a time interval quantities derives information duration of HRV. This analysis eases the prediction of heart rate fluctuation due to Covid or other heart disorders. The better accuracy level in diagnosing heart pulse irregularity using Artificial Neural network(ANN) is an integer value (0 to 4)but for Fuzzy Classifier, it is 0.8 to 0.9.The processing time for analyzing heart dysfunctionalities is 0.05s using ANN which is far better than Fuzzy classifier.

**Title**: ACE2 correlated with immune infiltration serves as a prognostic biomarker in endometrial carcinoma and renal papillary cell carcinoma: implication for COVID-19

**DOI**: 10.18632/aging.103100

**Classification**: 2

**Abstract**: Angiotensin-converting enzyme 2 (ACE2) is a member of the renin-angiotension system, however, the correlation between ACE2 and prognosis in UCEC (Uterine Corpus Endometrial Carcinoma) and KIRP (Kidney Renal Papillary Cell Carcinoma) is not clear. We analyzed the expression levels of ACE2 in the Oncomine and TIMER databases, the correlation between ACE2 and overall survival in the PrognoScan, GEPIA and Kaplan-Meier plotter databases. The correlation between ACE2 and immune infiltration level and the type markers of immune cells was investigated in TIMER database. A prognosis analysis based on the expression levels of ACE2 was further performed in related immune cells subgroup. The ACE2 promoter methylation profile was tested in the UALCAN database. In addition, we used GSE30589 and GSE52920 databases to elucidate the changes of ACE2 expression in vivo and in vitro after SARS-CoV infection. ACE2 was elevated in UCEC and KIRP, and high ACE2 had a favorable prognosis. The expression of ACE2 was positively correlated with the level of immune infiltration of macrophage in KIRP, B cell, CD4+T cell, neutrophil and dendritic cell immune infiltration levels in UCEC. ACE2 was significantly positively correlated with the type markers of B cells and neutrophils, macrophages in UCEC, while ACE2 in KIRP was positively correlated with the type markers of macrophages. High ACE2 expression level had a favorable prognosis in different enriched immune cells subgroups in UCEC and KIRP. And the promoter methylation levels of ACE2 in UCEC and KIRP were significantly reduced. What’s more, we found that the expression of ACE2 decreased in vivo and in vitro after SARS-CoV infection. In conclusion, ACE2 expression increased significantly in UCEC and KIRP, elevated ACE2 was positively correlated with immune infiltration and prognosis. Moreover, tumor tissues may be more susceptible to SARS-CoV-2 infection in COVID-19 patients with UCEC and KIRP, which may worsen the prognosis.

**Title**: Nowcasting the COVID‐19 pandemic in Bavaria

**DOI**: 10.1002/bimj.202000112

**Classification**: 2

**Abstract**: To assess the current dynamics of an epidemic, it is central to collect information on the daily number of newly diseased cases. This is especially important in real‐time surveillance, where the aim is to gain situational awareness, for example, if cases are currently increasing or decreasing. Reporting delays between disease onset and case reporting hamper our ability to understand the dynamics of an epidemic close to now when looking at the number of daily reported cases only. Nowcasting can be used to adjust daily case counts for occurred‐but‐not‐yet‐reported events. Here, we present a novel application of nowcasting to data on the current COVID‐19 pandemic in Bavaria. It is based on a hierarchical Bayesian model that considers changes in the reporting delay distribution over time and associated with the weekday of reporting. Furthermore, we present a way to estimate the effective time‐varying case reproduction number based on predictions of the nowcast. The approaches are based on previously published work, that we considerably extended and adapted to the current task of nowcasting COVID‐19 cases. We provide methodological details of the developed approach, illustrate results based on data of the current pandemic, and evaluate the model based on synthetic and retrospective data on COVID‐19 in Bavaria. Results of our nowcasting are reported to the Bavarian health authority and published on a webpage on a daily basis (https://corona.stat.uni-muenchen.de/). Code and synthetic data for the analysis are available from https://github.com/FelixGuenther/nc\_covid19\_bavaria and can be used for adaption of our approach to different data.

**Title**: Potent in vitro Neutralization of SARS-CoV-2 by Hetero-bivalent Alpaca Nanobodies Targeting the Spike Receptor-Binding Domain

**DOI**: 10.1101/2021.02.02.429311

**Classification**: 2

**Abstract**: Cell entry by SARS-CoV-2 requires the binding between the receptor-binding domain (RBD) of the viral Spike protein and the cellular angiotensin-converting enzyme 2 (ACE2). As such, RBD has become the major target for vaccine development, while RBD-specific antibodies are pursued as therapeutics. Here, we report the development and characterization of SARS-CoV-2 RBD-specific VHH/nanobody (Nb) from immunized alpacas. Seven RBD-specific Nbs with high stability were identified using phage display. They bind to SARS-CoV-2 RBD with affinity KD ranging from 2.6 to 113 nM, and six of them can block RBD-ACE2 interaction. The fusion of the Nbs with IgG1 Fc resulted in homodimers with greatly improved RBD-binding affinities (KD ranging from 72.7 pM to 4.5 nM) and nanomolar RBD-ACE2 blocking abilities. Furthermore, fusion of two Nbs with non-overlapping epitopes resulted in hetero-bivalent Nbs, namely aRBD-2-5 and aRBD-2-7, with significantly higher RBD binding affinities (KD of 59.2 pM and 0.25 nM) and greatly enhanced SARS-CoV-2 neutralizing potency. The 50% neutralization dose (ND50) of aRBD-2-5 and aRBD-2-7 was 1.22 ng/mL (∼0.043 nM) and 3.18 ng/mL (∼0.111 nM), respectively. These high-affinity SARS-CoV-2 blocking Nbs could be further developed into therapeutics as well as diagnosis reagents for COVID-19.

**Title**: Subjective Deterioration of Physical and Psychological Health during the COVID-19 Pandemic in Taiwan: Their Association with the Adoption of Protective Behaviors and Mental Health Problems

**DOI**: 10.3390/ijerph17186827

**Classification**: 2

**Abstract**: This study aimed to determine the proportion of individuals who reported the deterioration of physical and psychological health during the coronavirus disease 2019 (COVID-19) pandemic in Taiwan. Moreover, the related factors of deterioration of physical and psychological health and the association between deterioration of health and adoption of protective behavior against COVID-19 and mental health problems were also examined. We recruited participants via a Facebook advertisement. We determined the subjective physical and psychological health states, cognitive and affective construct of health belief, perceived social support, mental health problems, adoption of protective behavior and demographic characteristics among 1954 respondents (1305 women and 649 men; mean age: 37.9 years with standard deviation 10.8 years). In total, 13.2% and 19.3% of respondents reported deteriorated physical and psychological health during the COVID-19 pandemic, respectively. Participants with higher perceived harm from COVID-19 compared with severe acute respiratory syndrome (SARS) were more likely to report the subjective deterioration of physical and psychological health, whereas respondents who were older and perceived a higher level of social support were less likely to report a deterioration of physical and psychological health. The subjective deterioration of psychological health was significantly associated with avoiding crowded places and wearing a mask. Both subjective deteriorations of physical and psychological health positively related to general anxiety.

**Title**: Optimal surveillance mitigation of COVID'19 disease outbreak: Fractional order optimal control of compartment model

**DOI**: 10.1016/j.rinp.2020.103715

**Classification**: 2

**Abstract**: In present time, the whole world is in the phase of war against the deadly pandemic COVID'19 and working on different interventions in this regard. Variety of strategies are taken into account from ground level to the state to reduce the transmission rate. For this purpose, the epidemiologists are also augmenting their contribution in structuring such models that could depict a scheme to diminish the basic reproduction number. These tactics also include the awareness campaigns initiated by the stakeholders through digital, print media and etc. Analyzing the cost and profit effectiveness of these tactics, we design an optimal control dynamical model to study the proficiency of each strategy in reducing the virulence of COVID'19. The aim is to illustrate the memory effect on the dynamics of COVID'19 with and without prevention measures through fractional calculus. Therefore, the structure of the model is in line with generalized proportional fractional derivative to assess the effects at each chronological change. Awareness about using medical mask, social distancing, frequent use of sanitizer or cleaning hand and supportive care during treatment are the strategies followed worldwide in this fight. Taking these into consideration, the optimal objective function proposed for the surveillance mitigation of COVID'19, is contemplated as the cost function. The effect analysis is supported through graphs and tabulated values. In addition, sensitivity inspection of basic reproduction number is also carried out with respect to different values of fractional index and cost function. Ultimately, social distancing and supportive care of infected are found to be significant in decreasing the basic reproduction number more rapidly.