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Morning Brief : Scientific Review

8 April 2020

The purpose of the Morning Brief is to **summarize** and present key information, research articles and other relevant publications pertaining to critical care and COVID-19. We aim to prioritise information, articles and publications released in the preceding 24-48hours.

Stellenbosch University Research Response Team

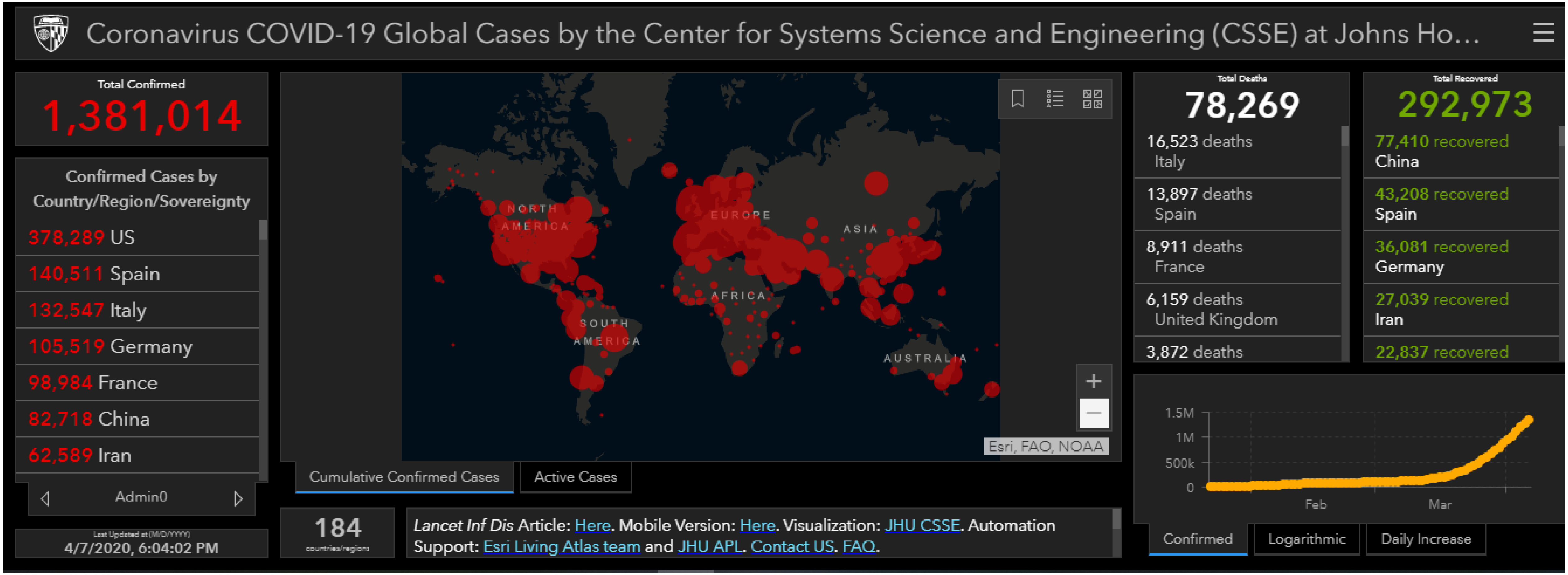
Content

- Global Update
- South African Update
- Media Release

Pathology findings in patients confirmed positive for COVID-19

- Articles of interest:
    1. **Pulmonary Pathology of Early-Phase 2019 Novel Coronavirus (COVID-19) Pneumonia in Two Patients With Lung Cancer**
    2. **General observation autopsy report of a new coronavirus pneumonia case**
    3. **Pathological findings of COVID-19 associated with acute respiratory distress syndrome**
    4. **A pathological report of three COVID-19 cases by minimally invasive autopsies**

Global update



Accessed at 19:04 on 7 April 2020
Source: https://coronavirus.jhu.edu/map.html

South African Update

The provincial breakdown is as follows:

GAUTENG	713
WESTERN CAPE	462
KWAZULU – NATAL	257
FREE STATE	89
EASTERN CAPE	32
LIMPOPO	19
MPUMALANGA	18
NORTH WEST	11
NORTHERN CAPE	8
UNALLOCATED	77

The total number of COVID-19 tests conducted to date is 58 098.

COVID-19 Statistics in South Africa

58098
Tests Conducted

1749
Positive Cases Identified

45
Recoveries

13
Deaths

Accessed at 19:11 on 7 April 2020

Source: https://sacoronavirus.co.za/

https://sacoronavirus.co.za/2020/04/06/update-on-covid-19-06th-april-2020/

Western Cape Media Release

LET'S STOP THE SPREAD

Municipality2	Cases
City of Cape Town	389
Cape Winelands District Municipality	28
Breede Valley	5
Drakenstein	6
Langeberg	1
Stellenbosch	16
Witzenberg	0
Central Karoo District Municipality	0
Beaufort West	0
Laingsburg	0
Prince Albert	0
Garden Route District Municipality	54
Bitou	5
George	13
Hessequa	5
Kannaland	0
Knysna	13
Mosselbay	16
Oudtshoorn	2
Overberg District Municipality	10
Cape Agulhas	0
Overstrand	9
Swellendam	0
Theewaterskloof	1
West Coast District Municipality	[illegible]
Bergriver	0
Cederberg	0
Matzikama	0
Saldanha Bay	2
Swartland	2

Western Cape Government

Accessed at 19:15 on 7 April 2020

Source: https://www.westerncape.gov.za/department-of-health/news/update-coronavirus-premier-alan-winde-world-health-day-opportunity-pay-tribute-nurses-and-focus

Articles of Interest

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Pulmonary Pathology of Early-Phase 2019 Novel Coronavirus (COVID-19) Pneumonia in Two Patients With Lung Cancer

Case 1
85 y female
1.5cm tumor in middle lobe, R lung
HT, type 2 DM
Asymptomatic, but with bilateral ground-glass opacities on CT, but at the time this picture was not associated with COVID-19.
Thoracoscopic resection of tumor
Tested PCR positive 12 days later
Deteriorated clinically, decreased lymphocytes, decreased eosinophils
Desaturated and died 17 days after operation.

Case2
73y male
HT, adenocarcinoma on needle biopsy
R lower lobe resection, lymph node resection
Patchy ground glass opacities on CT 2 days after operation R lung
Fever on day 9 after Opx, dry cough, dyspnoea
PCR positive, decreased lymphocytes
Recoverd, discharged 30 days after opx

Pathology specimen non-tumor parts
Alveolar oedema, exudate
Mild, patchy inflammatory infiltration
Focal fibrin clusters, mononuclear inflammatory cells and multinucleated giant cells in airspaces.
Severe pneumocyte hyperplasia, interstitial thickening
No prominent neutrophil infiltration

Pathology specimen non-tumor parts
Exudates
Diffuse thickening of alveolar walls
Proliferating interstitial fibroblasts, type II pneumocyte hyperplasia
Fibroblasts and multi-nucleated giant cells in airspaces

No hyaline membrane formation seen

Tian, S. et.al Pulmonary Pathology of Early-Phase 2019 Novel Coronavirus (COVID-19) Pneumonia in Two Patients With Lung Cancer, *Lancet Respir Med* 2020;8: 420–22

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General observation autopsy report of a new coronavirus pneumonia case

1 patient, China
85y male
Presented with fever and itchy throat
SARS-CoV2 PCR positive
Died of respiratory distress 28 days after admission
Lab: HB and lymphocytes gradually decreased during course of illness
Autopsy within 12 hours of death

Macroscopic findings reported
bilateral pleural effusions of 150 mL each
gray-white viscous fluid in parts of lung
Foamy and jelly-like mucus found in trachea and bronchi of right lung
Clear light yellow fluid seen in peri-cardial cavity
Atherosclerotic plaque found in right coronary artery
Abdominal cavity – small amount of light clear fluid
Cerebral oedema, no haemmorhage

Liu, Q. et.al General observation autopsy report of a new coronavirus pneumonia case; Journal of Forensic Medicine, 2020,36(1): 19-21 (in Chinese) doi : 10.12116/j.issn.1004-5619.2020.01.00

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Pathological findings of COVID-19 associated with acute respiratory distress syndrome

50 y male
Presented with fever, cough, shortness of breath
SARS-CoV-2 PCR positive
Treatment:
interferon alfa-2b
Lopinavir/ritonavir
moxifloxacin
Methylprednisolone
He refused ventilator support, but maintained O2 sats above 95% on high-flow nasal cannula O2

Day 14 worsening of hypoxia
Sudden cardiac arrest
Resuscitation unsuccessful
Biopsies of lung, heart, liver

Right lung
desquamation of pneumocytes and hyaline membrane consistent with acute respiratory distress syndrome

Left lung
pulmonary oedema with hyaline membrane formation, suggestive of early ARDS
Interstitial mononuclear inflammatory infiltrates, dominated by lymphocytes, were seen in both lungs.
Multinucleated giant cells and large atypical pneumocytes in the intra-alveolar spaces.
No obvious intranuclear or intracytoplasmic viral inclusions were identified.

There were a moderate interstitial mononuclear inflammatory infiltrates, but no other substantial damage in the heart tissue.

Flow cytometry on peripheral blood:
CD4 and CD8 T cells reduced, but in a hyperactivated state
increased relative concentration of highly proinflammatory CCR6+ Th17 cells
CD8 T cells had high concentrations of cytotoxic granules

Xu, Q. et.al Pathological findings of COVID-19 associated with acute respiratory distress syndrome, *Lancet Respir Med* 2020;8: 420–22

A pathological report of three COVID-19 cases by minimally invasive autopsies

3 patients, China
Minimally invasive autopsy, 1 hour after death

2 males (63, 69), 1 female (79)
Comorbidities: DM (1), Hx of oral ca (1)
PCR positive and with typical signs on CT
Cough, runny nose, fever, fatigue
Respiratory distress 5 - 10 days after onset
Death 17 - 19 days after onset

Lab:
- high neutrophil count
- lymphopaenia
- low eosinophils

Treatment:
- recombinant human interferon α -1β
- Lopinavir/ritonavir
- thymosin
- methylprednisolone sodium
- human immunoglobulin

- Cardiomyocyte hypertrophy, degeneration and necrosis
- Mild interstitial oedema
- Infiltration of a small number of lymphocytes, monocytes and neutrophils
- Immunohistochemical staining:
  - inflammatory cells in myocardium were macrophages and a small number of CD4+ T cells
  - no CD8+ T cells or CD20+ B cells
- No SARS-CoV-2 detected in myocardial tissue (electron microscopy, immunohistochemical staining, PCR)

- Hyaline membrane formation in some alveoli.
- Immune cells in alveoli were mostly macrophages and monocytes.
- Multinucleated giant cells, CD4+ T lymphocytes, eosinophils and neutrophils
- Proliferation of type II alveolar epithelial cells
- Alveolar septum capillaries dilated, oedoematous, infiltration of monocytes and lymphocytes, hyaline thrombi in a minority
- Focal haemorrhage, interstitial fibrosis
- Virus detected in bronchial mucosa and type II alveolar epithelial cells, macrophages

Other:
- Necrosis in spleen
- No virus detected in other organs

Yao XH, Li TY, He ZC, et al. Zhonghua Bing Li Xue Za Zhi. 2020;49(0):E009. doi:10.3760/cma.j.cn112151-20200312-00193

References

1. Tian , S. et.al Pulmonary Pathology of Early-Phase 2019 Novel Coronavirus (COVID-19) Pneumonia in Two Patients With Lung Cancer, *Lancet Respir Med* 2020;8: 420–22
2. *Liu, Q. et.al General observation autopsy report of a new coronavirus pneumonia case; Journal of Forensic Medicine, 2020,36(1): 19-21 (in Chinese) doi : 10.12116/j.issn.1004-5619.2020.01.00*
3. Xu, Q. et.al Pathological findings of COVID-19 associated with acute respiratory distress syndrome, Lancet Respir Med 2020;8: 420–22
4. Yao XH, Li TY, He ZC, et al. Zhonghua Bing Li Xue Za Zhi. 2020;49(0):E009. doi:10.3760/cma.j.cn112151-20200312-00193

This summary was prepared by Dr Elizna Maasdorp and Stellenbosch University student Sergio Alves (MB,ChB 5) as part of the daily brief to the TBH ICU Team (8 April 2020)