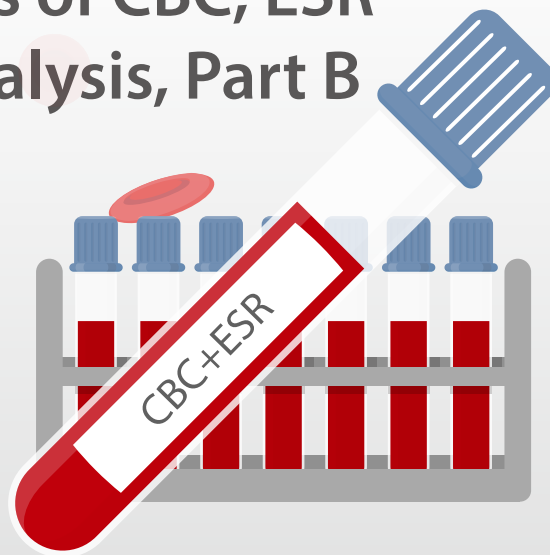


Applications of CBC, ESR and CRP Analysis, Part B

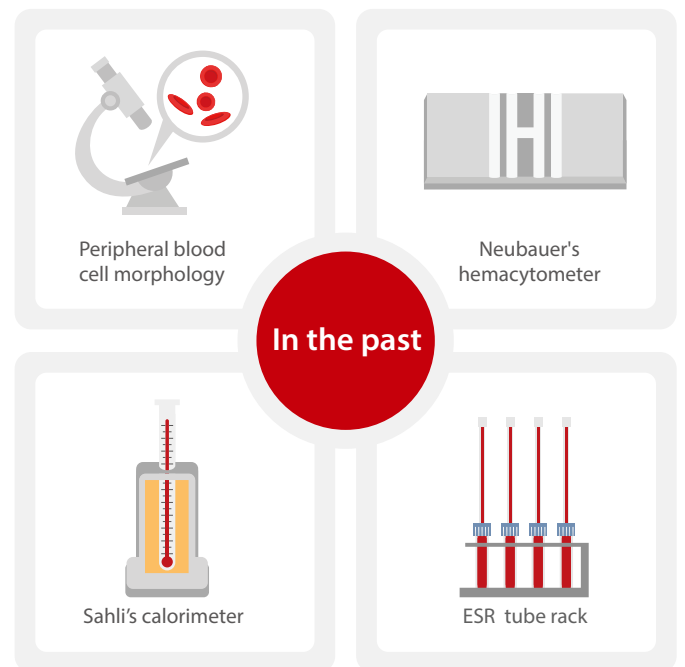


Three routine laboratory tests

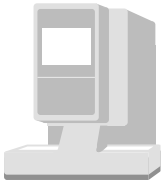


Blood, urine and feces analysis are the three common tests in clinical laboratories. Among them, blood testing is the most important way to keep track of one's overall physical well-being.


In the past, routine blood tests were performed manually on a microscope, Neubauer's hemacytometer, Sahli's colorimeter and ESR tube rack.



In addition to complete blood count (CBC) and white blood cell differential (DIFF) count which have become fully automated, other simple but time-consuming blood tests like ESR and CRP also transform from manual methods to automated analysis. Integrated systems have been developed for easier operation.

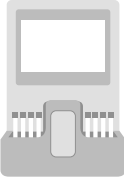


BC-7500
Hematology
Analyzer with CRP

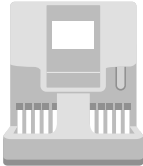


MC-80 Digital Cell
Morphology
Analyzer

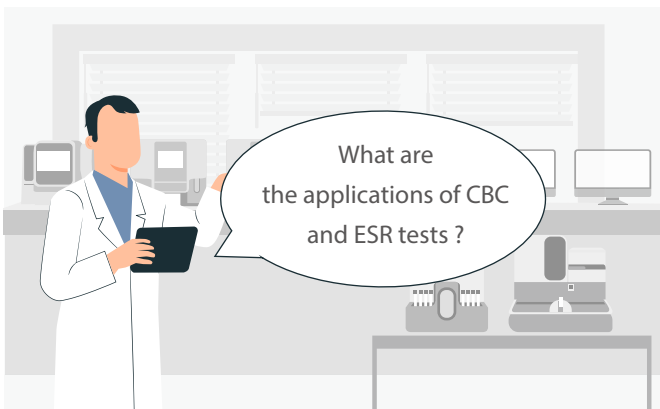
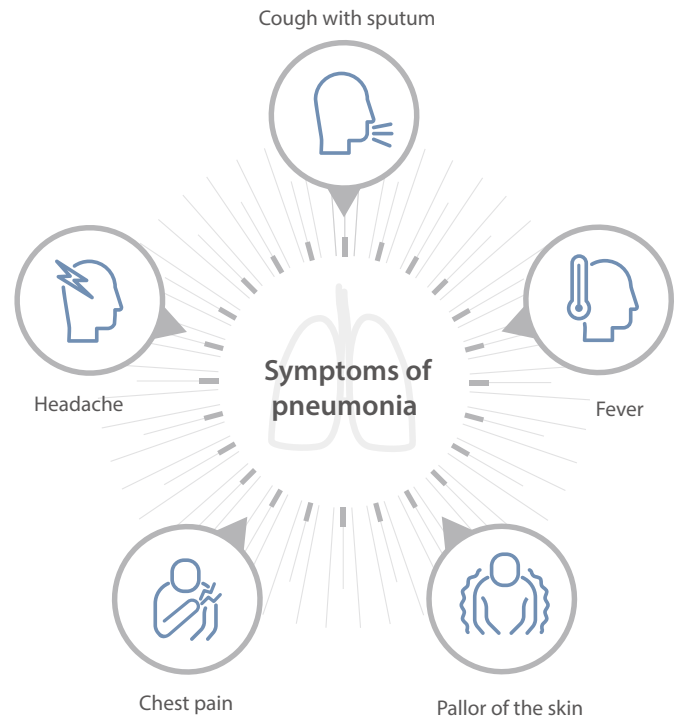
Nowadays



BC-700 Series
Hematology Analyzer
with ESR



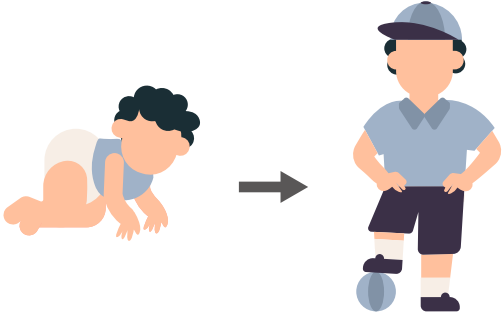
BC-6800Plus
Hematology
Analyzer



Study A

A comparison of different investigations in their sensitivities for the diagnosis of Community Acquired Pneumonia (CAP)

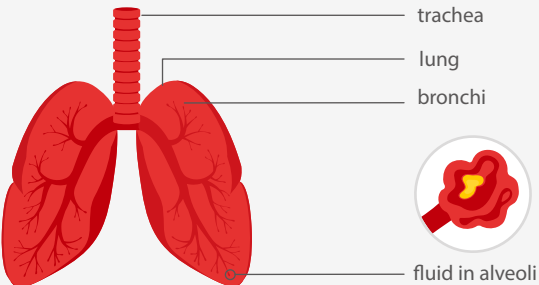
Age group



One-month to 5-year old

Diagnosis of pulmonary diseases

Pneumonia of the lungs



- trachea
- lung
- bronchi
- fluid in alveoli

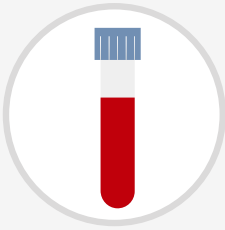
Diagnostic methods



Chest radiographs



Blood culture



serum C-reactive protein (CRP), erythrocyte sedimentation rate (ESR), total leucocyte count (TLC)

Results

Diagnostic method	Positive +ve	N=? (Total n= 66)
Chest radiographs	93.9%	62
Blood culture	6.1%	4
CRP	90.9%	60
ESR	72.7%	42
TLC	48.5%	38

Conclusion

Both CRP and ESR analysis can be used as an alternative test to the chest radiographs at peripheral centres, where X-ray machines are not available.

Study B

Elevated Erythrocyte Sedimentation Rate Is Predictive of Interstitial Lung Disease and Mortality in Dermatomyositis: A Korean Retrospective Cohort Study

Age group

Interstitial lung disease (ILD) is a major cause of death in patients with dermatomyositis (DM). This study was aimed to examine the utility of the erythrocyte sedimentation rate (ESR) as a predictor of ILD and prognostic marker of mortality in patients with DM.

Target group

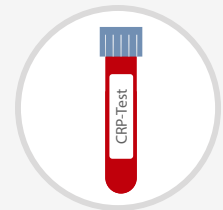


144 patients with DM, including 28 with clinically amyopathic DM (CADM).

Methods



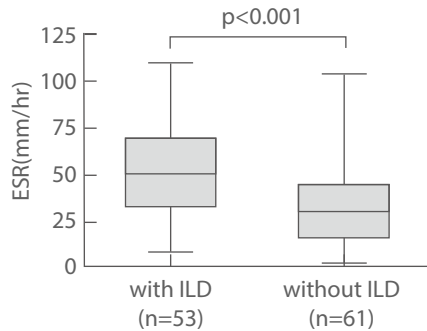
Diagnosis of ILD:
High resolution computed tomography (HRCT) scans



Examination of the association between elevated ESR and pulmonary impairment and mortality

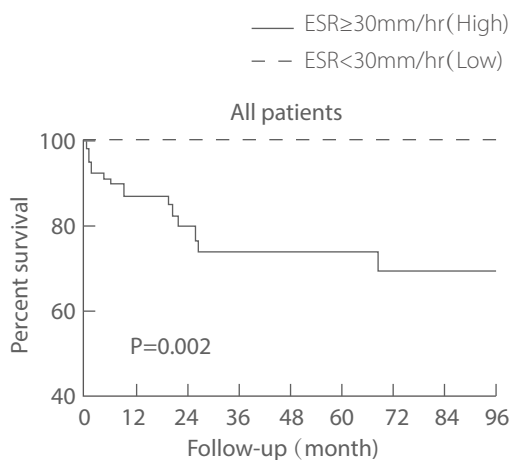
Results

Association between elevation of the baseline ESR and pulmonary impairment in patients with DM.



ESR levels at the time of DM diagnosis were higher in patients with ILD than in those without.

Elevated ESR was predictive of mortality.



Low	44	32	22	18	14	11	5	2	0
High	70	43	29	21	18	17	11	5	2
	Number at risk								

All-cause mortality for patients with a baseline ESR ≥ 30 mm/hour was higher than that for patients with a baseline ESR < 30 mm/hour. No deaths were observed in DM patients with a normal baseline ESR, even after 8 years of follow-up.

Conclusion

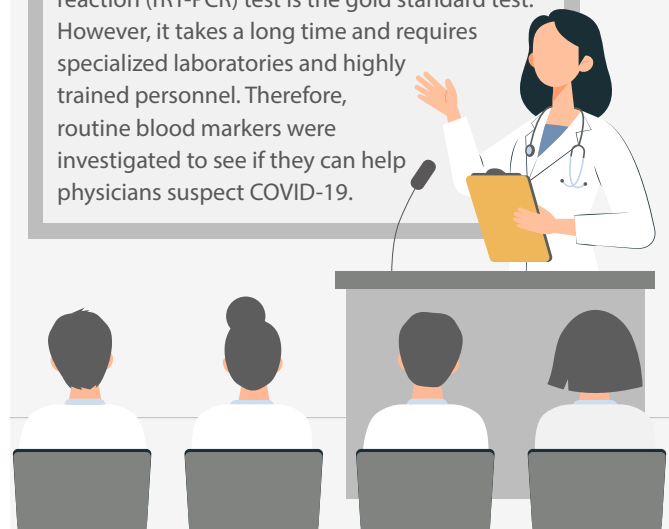
Elevated ESR is associated with increased mortality in patients with DM due to respiratory failure. Thus, monitoring ESR should be an integral part of the clinical care of DM patients.

Applications in covid-19

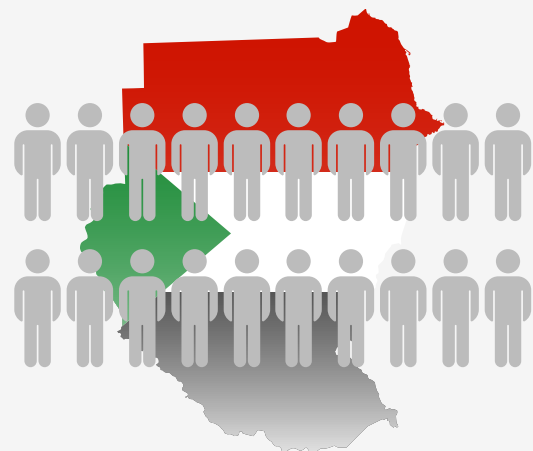
Study C

Blood markers (percentage of lymphocytes, neutrophils, CRP and ESR) can help prioritize RT-PCR testing in patients suspected of Covid-19 in countries with limited health resources

Real-time reverse transcription polymerase chain reaction (rRT-PCR) test is the gold standard test. However, it takes a long time and requires specialized laboratories and highly trained personnel. Therefore, routine blood markers were investigated to see if they can help physicians suspect COVID-19.

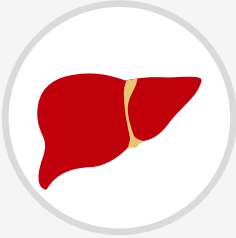


Target group

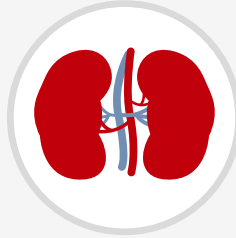


56 COVID-19 patients from Sudan

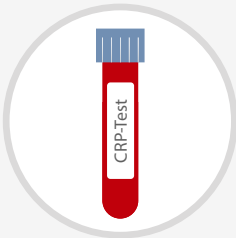
Methods



liver function tests (LFT)



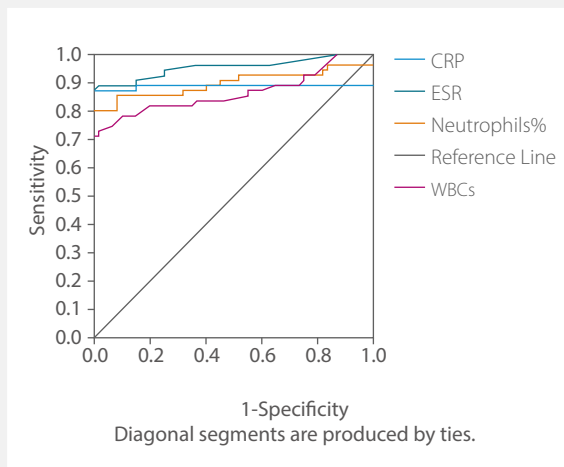
renal function tests (RFT)



complete blood count (CBC), CRP, ESR

Results

Lymphocytes % showed decrease to 9.2 (P-value=0.000) and significant increase in neutrophils to 83.05 (P-value=0.005), ESR to 65.54 (P-value=0.000) and CRP to 91.07 (P-value=0.000).



The receiver operating characteristic curve (ROC)/area under the curve (AUC) ensured the expellant result of lymphocytes % as a predictor with 92% area under the curve, neutrophils were 90% and ESR 95.8%.

The percent of detecting COVID-19 positive RT-PCR (98%) for suspected individuals using ROC showed best cutoff of ≤ 21.8 for lymphocytes %, ≥ 67.7 for neutrophils, ≥ 37.5 for ESR, ≥ 6.2 for CRP and ≥ 7.15 for WBCs.

Conclusion

Lymphocyte percentages, neutrophils, CRP and ESR can be used as markers for COVID-19, helping in prioritizing individuals for rRT-PCR tests.

Diagnostic value of combined ESR and WBC tests for inflammation

- ESR and CRP are traditional biomarkers of inflammation.
- Elevated levels only indicate that there is a focus of inflammation somewhere in the body, but the tests cannot pinpoint the exact location of inflammation.
- ESR and CRP can be used as routine aides to detect inflammation and monitor treatment effectiveness.
- After high levels are detected, the patient should undergo reexamination every 1 to 3 months to help determine whether the treatment is successful in reducing inflammation.



Relationship between the change of inflammatory markers (WBC, ESR and CRP) and the use of antibiotics during hospitalization.

Mindray is going to launch a new hematology series that incorporates both CBC and ESR analysis. Stay tuned for our global launch lunch event on March 2 !

Registration link to the BC-700 Series Hematology Analyzer Virtual Launch Event:

<https://www.mindray.com/en/events/bc-700-launch>



References

- [1] Sections 1–4, Chapter Two in Volume I of Clinical Laboratory Medicine Foundation (Version 2), China Medical Science and Technology Press
- [2] Section I FBC Tests in Chapter 2 of Manual for Clinical Laboratory Diagnosis, People’s Military Medical Press
- [3] Routine Blood Tests in User Manual for Tests (Version 2), Peking University Shenzhen Hospital
- [4] Lakhani D, Muley P. The association of positive chest radiograph and laboratory parameters with community acquired pneumonia in children. Journal of Clinical and Diagnostic Research. 2013; 7(8):1629-1631
- [5] Dhairya L, Prasad M. The Association of Positive Chest Radiograph and Laboratory Parameters with Community Acquired Pneumonia in Children. Journal of diagnostic research. 7(8): 1629–1631. DOI : 10.7860/JCDR/2013/5132.3222, 2013
- [6] Dong J, Eun Y. Elevated Erythrocyte Sedimentation Rate Is Predictive of Interstitial Lung Disease and Mortality in Dermatomyositis: a Korean Retrospective Cohort Study. J Korean Med Sci. 2016; 31(3): 389–396. doi: 10.3346/jkms.2016.31.3.389

mindray

healthcare within reach

Follow Mindray on Social Media

LinkedIn



Join LabClub, a global online community
for lab professionals.



www.mindray.com

P/N: ENG-Applications of CBC, ESR and CRP Analysis, Part B
-210X7P-20220301

©2022 Shenzhen Mindray Bio-Medical Electronics Co.,Ltd. All rights reserved.