ICU
MANAGEMENT & PRACTICE

Multitarget treatments for sepsis more effective?

Sepsis is a dysregulation of the body's normal inflammatory response to injury and infection. New research from the University of Chicago suggests that efforts to combat sepsis might be more effective if they targeted multiple steps in the molecular processes that drive the illness. Researchers employed a computational model of the human immune response to infectious injury to offer an explanation as to why the current approach to drug/therapy-development is inadequate.

"This work evaluating the extent of interventions needed to control a simplified surrogate model of sepsis provides insight into the scope of the clinical challenge, and can serve as a guide on the path towards true 'precision control' of sepsis, according to the study published in PLOS Computational Biology.

People with sepsis may receive oxygen and intravenous fluids, as well as antibiotics to fight the underlying infection, but the condition kills 28 to 50 percent of affected patients. So far, drugs developed to attack the molecular processes that underpin sepsis have not shown clinical success.

For this simulation study, Chase Cockrell and Gary An, both with the Department of Surgery at UChicago, utilised a computational model of the human immune system, which they had previously developed specifically to investigate systemic inflammation. The model simulates how immune system cells and signalling molecules behave during sepsis, as well as the effects of disrupting various parts of these processes.

Using their model, the researchers showed that disrupting a single signalling process at a single point (or just a few points) in time would not be adequate to treat sepsis. This may explain why previous attempts that employed such a strategy have not been effective. Instead, the simulation showed, successful treatment would require drugs that frequently target multiple immune system processes.

The study also highlighted that a "one-size-fits-all" multitarget approach would still be inadequate, and true "precision medicine" would require a treatment to adapt itself based on each patient's individual response. The researchers concluded that computational modelling is necessary to generate the amount of data required by machine-learning algorithms to aid development of effective sepsis drugs.

"This project provides a reality check on how people are currently thinking about trying to treat sepsis at a drug-design level," Cockrell says. "It will hopefully help focus research into those areas that will actually provide a path towards effective therapy, such as high-resolution diagnostics and sampling, and realising that there is no 'one-size-fits-all' answer."

Source: PLOS
Image Credit: Pixabay

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