

## Perfusion disturbances due to excessive alkalosis

### 【Risk from excessive alkalosis】

If echinocytized red blood cells agglutinate into the oxygenator or arterial filter due to excessively alkalotic priming solution, and irreversible changes occur, change-out of the oxygenator, etc., becomes necessary. Pay close attention to the pH of the priming solution as it can be a risk factor in extracorporeal circulation.

### 【Causes】

The following factors may predispose to excessive alkalosis:

- 1) Excessive administration of alkalizing agent as priming solution
- 2) Insufflation of mixed oxygen gas during priming
- 3) Rapid administration of alkalizing agent during extracorporeal circulation



### 【Points to note】

- 1) Depending on the combination of various Ringer's solutions and alkalizing agents, alkalosis may be higher than expected.
- 2) Even if the priming solution has an adequate pH, insufflation of mixed oxygen gas will cause the priming solution to lean toward alkalosis in the oxygenator. During recirculation, this tendency is more pronounced throughout the circuit, and in the case of blood priming, erythrocyte deformation is expected to occur at this stage.



### Countermeasures

The following 4 methods are available as countermeasures. However, when changing the priming composition or the procedure of the cardiopulmonary bypass operation, please consult with the physician thoroughly and follow the methods appropriate for each facility to ensure not to make errors.

- 1) Measure the pH of the priming solution immediately before initiating extracorporeal circulation, and review and adjust the amount of alkalizing agent added to keep pH below 8.0
- 2) When blood priming hemofiltration or MUF (modified ultrafiltration) is performed, pay attention to the pH of the replenishing solution for filtration and measure the pH during operation.
- 3) Do not insufflate mixed oxygen gas until the initiation of extracorporeal circulation. Especially, do not insufflate mixed oxygen gas during recirculation.
- 4) Administration of alkalizing agents during extracorporeal circulation should be performed by dripping.

### Reference

- Anthony Richard Fischer et al.: Normal and abnormal trans-oxygenator pressure gradients during cardiopulmonary bypass. *Perfusion*, 18; p25-30, 2003.