

# **EHJ state of the art review**

Cao D, et al., Eur Heart J. 2023;44(20):1780-1794.



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# Reversal and removal of oral antithrombotic drugs in patients with active or perceived imminent bleeding

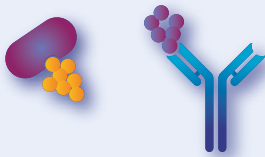
Cao D, Amabile N, Chiarito M, Lee VT, Angiolillo DJ, Capodanno D, Bhatt DL, Mack MJ, Storey RF, Schmoeckel M, Gibson CM, Deliargyris EN, Mehran R

Eur Heart J. 2023;44(20):1780-1794.

## Strategies to prevent or stop major bleeding associated with oral antithrombotic therapy

### Specific reversal

#### Anticoagulant drug reversal



**Idarucizumab** (*dabigatran*):  
humanized monoclonal Ab

**Andexanet alfa** (*factor Xa inhibitors*):  
modified human factor Xa decoy protein

**Vitamin K** (*VKA*):  
promotes formation of activated factors II, VII, IX and X

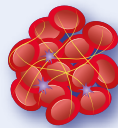
#### Antiplatelet drug reversal



**Bentricimab** (*ticagrelor*):  
human monoclonal Ab fragment

### Nonspecific reversal

#### Coagulation restoration



**Ciraparantag** (*DOACs*):  
small cationic protein

**Prothrombin complex concentrates** (*VKA, DOACs*):  
contain factors II, VII, IX and X

**Fresh-frozen plasma** (*VKA, DOACs*):  
contains all coagulation factors

**Tranexamic acid**:  
antifibrinolytic activity via inhibition of plasminogen activation and binding to fibrin

#### Platelet restoration

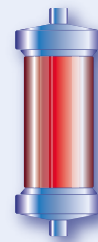


Uncertain clinical benefit of  
**platelet transfusion**

**Desmopressin**:  
improves platelet function via factors VIII and von Willebrand

### Removal

#### Drug removal



Adsorption of a wide range of antithrombotic drugs from the bloodstream by a cartridge incorporated in extracorporeal haemoperfusion circuits

Adjusted graph based on the figure published in the research paper.

## There are three strategies in the treatment of bleeding related issues:

1. Specific, new and quite costly anticoagulant drug reversal (e.g. bentricimab etc.)
2. Restoration of the coagulation system by goal-directed (ROTEM guided) administration of different coagulations factors etc.
3. **NEW: antithrombotic drug removal**