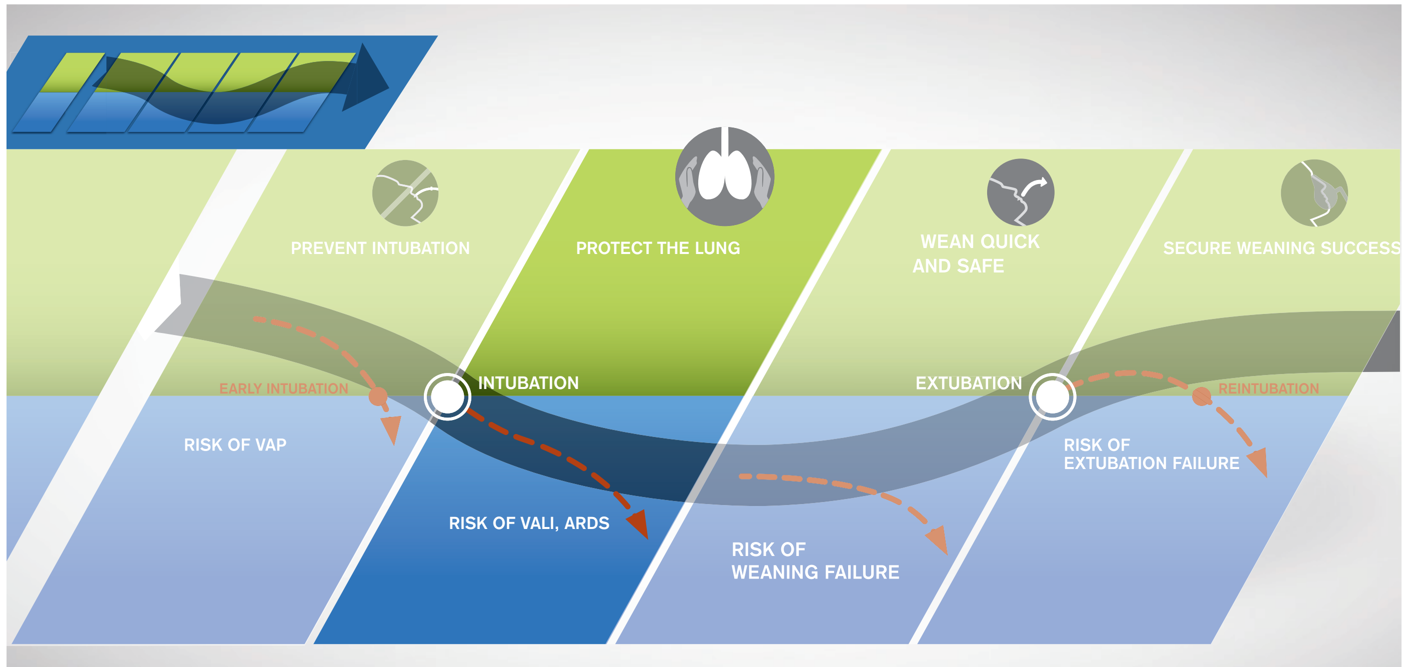
Airway Pressure Release Ventilation

Airway Pressure Release Ventilation (PC-APRV) enables spontaneous breathing under continuous positive airway pressure with brief pressure releases. With PC-APRV you could maximize the benefits of spontaneous breathing and stabilize and maintain the end expiratory lung volume.

"10% of all admitted ICU patients develop an acute ARDS and their mortality is between 35 and 45%."[1]

"Acute respiratory distress syndrome (ARDS) might be a consequence of ventilator associated lung injury (VALI) that should be prevented rather than treated."[2]

Stabilize the patient and protect the lung as second step of the Respiration Pathway



MECHANICAL VENTILATION

As non-invasive as possible, as invasive as necessary. Along the Respiration Pathway a variance and diversity of treatment tools clearly improve the clinical decision-making.

PC-APRV facilitates spontaneous breathing by delivering continuous positive airway pressure (CPAP) and augments ventilation with brief releases.

1 Bellani G et al. Epidemiology, Patterns of Care, and Mortality for Patients With Acute Respiratory Distress Syndrome in Intensive Care Units in 50 Countries. JAMA. 2016;315(8):788-800
2 Villar J, Slutsky AS. Is acute respiratory distress syndrome an iatrogenic disease? Crit Care. 2010;14(1):120

PC-APRV

It's a pressure controlled ventilation mode where it's possible to set two different level of pressure (Phigh and Plow) and two different timings for the two pressure levels (Thigh and Tlow).

In PC-APRV, the patient's spontaneous breathing takes place at the upper pressure level Phigh. This pressure level Phigh is maintained for the duration of Thigh. The alternation between the two pressure levels is machine-triggered and time cycled.

The breathing volume expired during the release times, results from the pressure difference between Phigh and Plow and the lung mechanics.
Since resistance and/or compliance may change during the ventilation treatment, the supplied tidal volume and thus the minute volume also vary.

MAIN CHARACTERISTICS OF APRV

- Allows spontaneous breathing at any time
- CO_2 removal by spontaneous breaths and forced during release time
- Weaning "drop and stretch" (to straight CPAP)

When the underlying pulmonary condition is restrictive and hypoxic in nature, fewer and shorter releases should be scheduled to avoid de-recruitment and maintain end-expiratory lung volume. When hypercapnia is an issue, more and longer releases will be required to assure sufficient ventilation.

The clinical use of APRV has been shown to facilitate spontaneous breathing and is associated with decreased peak airway pressures and improved oxygenation/ventilation when compared with conventional ventilation. Additionally, improvements in hemodynamic parameters, splanchnic perfusion, and reduced sedation/neuromuscular blocker requirements have been reported.[3]
APRV may offer potential clinical advantages for ventilator management of acute lung injury/acute respiratory distress syndrome and may be considered as an alternative "open lung approach" to mechanical ventilation.[3]

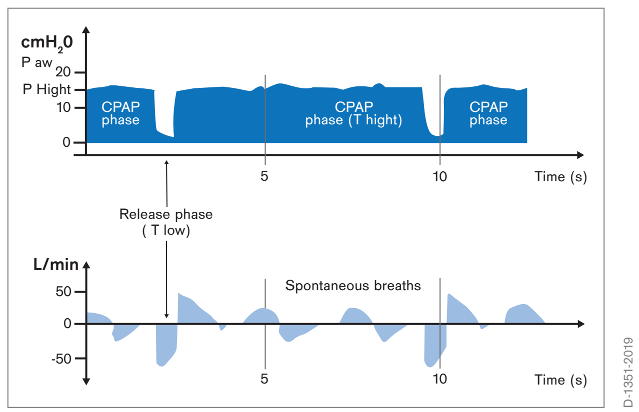
AutoRelease is an optional function available during PC-APRV. During the activation of AutoRelease, the duration of pressure releases is determined by the expiratory flow trace. The Exp. term. setting determines the percentage by which the expiratory flow must fall short of in relation to the peak flow for the ventilation to return to the high pressure level. When AutoRelease is switched on, the changeover from the upper pressure level Phigh to the lower pressure level Plow is synchronised with the patient's spontaneous breathing.

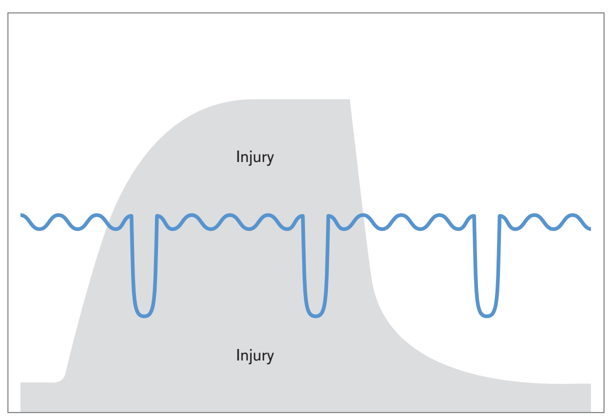
3 Habashi NM. Other approaches to open-lung ventilation: airway pressure release ventilation. Crit Care Med. 2005 Mar;33(3 Suppl):S228-40

- The improvement of gas exchange is the primary goal of any ventilation strategy in critically ill patients.
- Spontaneous breathing has inherent advantages that lead to an increase in alveolar recruitment and pulmonary perfusion.
- Highly homogeneous gas distribution within the lungs, together with stable hemodynamics, lead to improved organ oxygenation.[1]

BENEFITS OF APRV BECAUSE OF SPONTANEOUS BREATHING:

- Maintains "natural" breathing variability
- Modifies dependent transpulmonary pressure
- Improves V/Q matching
- Increases venous return/cardiac output
- Decrease sedation and eliminate NMBA
- Through short Pressure Release Ventilation, expiration (CO_2 elimination) is improved.
- Because of the extremely short phase of the pressure release an Intrinsic PEEP builds up in the fast compartments (short time constant), which prevents end expiratory collapse of the respective airways.
- Therefore EELV is raised and ventilation / perfusion mismatch is improved leading to better oxygenation.
- ATC can be used to overcome WOB associated with the ETT[3]





Balancing adequate end-expiratory lung volume and hyperinflation with APRV. A high continuous airway pressure maintains lung volume, intermittent releases contribute to CO_2 elimination.

1 al. Epidemiology, Patterns of Care, and Mortality for Patients With Acute Respiratory Distress Syndrome in Intensive Care Units in 50 Countries. JAMA. 2016;315(8):788-800
3 Habashi NM. Other approaches to open-lung ventilation: airway pressure release ventilation. Crit Care Med. 2005 Mar;33(3 Suppl):S228-40

AIRWAY PRESSURE RELEASE VENTILATION

Improved outcomes have been shown with APRV

"APRV with spontaneous breathing increased oxygenation, cardiac index, and pulmonary compliance with reduced sedation requirements as compared with conventional positive pressure ventilation."

Putensen, C. Zech, S. et al. Long-Term Effects of Spontaneous Breathing During Ventilatory Support in Patients with Acute Lung Injury, American Journal of Critical Care Medicine 2001; 164; 43-49.

"Reduced alveolar and conducting airway micro-strain as well as increased alveolar homogeneity using a personalized APRV approach."

Kollish-Singule, M. Emr, B. et al. APRV Reduces Conducing Airway Micro-Strain in Lung Injury, Journal of American College of Surgeons 2014, 219.9.

"In patients suffering from moderate to severe ARDS, application of APRV improved lung function and hemodynamics. It also reduced the need for sedatives and the duration of mechanical ventilation as well as days in ICU."

Li JQ. et al. Clinical research about airway pressure release ventilation for moderate to severe acute respiratory distress syndrome. Eur Rev Med Pharmacol Sci. 2016 Jun;20(12):2634-41

APRV allows for a personalized control of lung stability on a breath-to-breath basis that is not possible with other modes of ventilation.

Sumeet et al. The 30-year evolution of airway pressure release ventilation (APRV) Intensive Care Med Exp. 2016, 4:11.

APRV IS AVAILABLE FOR THE FOLLOWING DRÄGER VENTILATORS:

- Evita V800
- Evita V600
- Evita Infinity V500*
- Evita V300
- Babylog VN800
- Babylog VN600
- Babylog VN500**
- Savina 300
- Savina 300 Select

* Infinity Acute Care System Workstation Critical Care
** Infinity Acute Care System Workstation Neonatal Care

D-5759-2018

Dräger Evita V800

TECHNICAL DATA

Airway Pressure Release Ventilation APRV	Evita V800/ Evita V600	Evita Infinity V500/Evita V300	Babylog VN800	Babylog VN500	Savina300 Select/ Savina 300
Inspiratory time Thigh	0.1 to 30 s	0.1 to 30 s	0.1 to 30 s	0.1 to 30 s	0.2 to 22.0 s
Expiratory time Tlow	0.05 to 30 s	0.05 to 30 s	0.05 to 30 s	0.05 to 30 s	0.1 to 22.0 s
Maximum duration of lower pressure level Tlow max	0.05 to 30 s	0.05 to 30 s	0.05 to 30 s	0.05 to 30 s	
Upper pressure level Phigh	1 to 95 mbar (or hPa or cmH$_2$O)	1 to 95 mbar (or hPa or cmH$_2$O)	1 to 80 mbar (or hPa or cmH$_2$O)	1 to 80 mbar (or hPa or cmH$_2$O)	1 to 95 mbar (or hPa or cmH$_2$O)
Lower pressure level Plow	0 to 50 mbar (or hPa or cmH$_2$O)	0 to 50 mbar (or hPa or cmH$_2$O)	0 to 35 mbar (or hPa or cmH$_2$O)	0 to 35 mbar (or hPa or cmH$_2$O)	0 to 50 mbar (or hPa or cmH$_2$O)
Expiration termination criterion (in relation to the peak expiratory flow)	Exp. term 1 to 80 % Flowepeak	1 to 80 %PEF	Exp. term 1 to 80 % Flowepeak	1 to 80 %PEF	

CORPORATE HEADQUARTERS
Drägerwerk AG & Co. KGaA
Moislinger Allee 53–55
23558 Lübeck, Germany

www.draeger.com

Manufacturer:
Drägerwerk AG & Co. KGaA
Moislinger Allee 53–55
23542 Lübeck, Germany

REGION DACH
Drägerwerk AG & Co. KGaA
Moislinger Allee 53–55
23558 Lübeck, Germany
Tel +49 451 882 0
Fax +49 451 882 2080
info@draeger.com

REGION EUROPE
Drägerwerk AG & Co. KGaA
Moislinger Allee 53–55
23558 Lübeck, Germany
Tel +49 451 882 0
Fax +49 451 882 2080
info@draeger.com

REGION MIDDLE EAST, AFRICA
Drägerwerk AG & Co. KGaA
Branch Office
P.O. Box 505108
Dubai, United Arab Emirates
Tel +971 4 4294 600
Fax +971 4 4294 699
contactuae@draeger.com

REGION ASIA PACIFIC
Draeger Singapore Pte. Ltd.
25 International Business Park
#04-20/21 German Centre
Singapore 609916
Tel +65 6308 9400
Fax +65 6308 9401
asia.pacific@draeger.com

REGION NORTH AMERICA
Draeger, Inc.
3135 Quarry Road
Telford, PA 18969-1042, USA
Tel +1 800 4DRAGER
(+1 800 437 2437)
Fax +1 215 723 5935
info.usa@draeger.com

REGION CENTRAL AND SOUTH AMERICA
Dräger Panama S. de R.L.
59 East Street, Nuevo Paitilla,
House 30, San Francisco Town
Panama City, Panama
Tel +507 377 9100
Fax +507 377 9130
servicioalcliente@draeger.com

Locate your Regional Sales Representative at:
www.draeger.com/contact