



**endovision**  
infinite vision of the medical device

# Bi-portal Spine Endoscopic Surgery from Endovision



**ENDOVISION**, which leads the medical device industry with innovative products, studies, develops, and manufactures a wide range of product mainly,

## 1. Spinal endoscopy (Bi-portal)

## 2. Bio-materials

(hemostat / wound healing / tissue regeneration)

## 3. Arthroscopy

## 4. Endoscopy & Laparoscopy

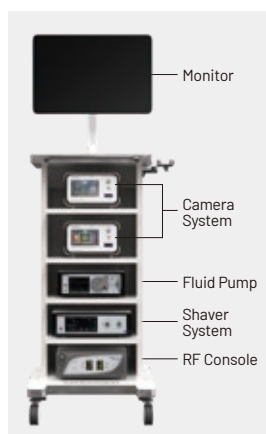
## 5. Gynecology

## 6. R&D

with continuous R&D activities for the next generation and advanced bio & mechanical medical device market. The goal of ENDOVISION is to create the safest products and services that satisfy our customers based on original technology and experts in each field.

## Bi-portal Spinal Endoscopy Technique & World Standard with a Mecca by Endovision

- Based on 'Translaminar lumbar epidural endoscopy'
- Two portals endoscopic : one portal for scope (vision), the other for instruments
- Procedure is same as open surgery & The most minimally Invasive surgery with safe for patients.
- Applicable cases : All types of MIS (Discectomy, Stenosis and Fusion)



Endovision UBE Spine Endoscopy  
Total Solution System

## Bi-portal Spinal Endoscopy - Main Benefits

- The most minimally Invasive surgery / Wider working space
- Excellent and clear visualization / Broader Indication
- Short surgery time with less fatigue / Reliable Result / Short recovery time

## RF plasma generator by ENDOVISION

Founded In 2013, ENDOVISION participated in the development of UBE (Unilateral Biportal Endoscopy) Spine surgery and holds technology and patents for UBE-dedicated medical devices. Starting with UBE surgery, we expanded and optimized the technology to one-portal spine surgery, sports medicine, ENT area. In particular, we have developed a high-tech plasma generator to ensure safe operation and maximize the surgical effect by possessing innovative technology capable of realizing more stable expression of medical plasma instead of simple electrical signal.

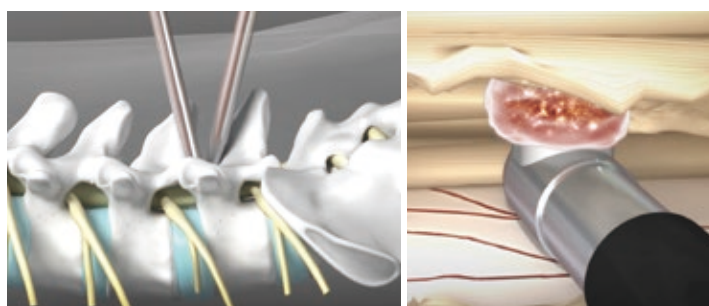
## Stages of plasma generation

- ① **First stage** : Vapor gas piston formation Decreases heat emission and increase in surface temperature.
- ② **Second stage** : Stage of vapor film pulsation Tissue ablation occurs during this stage.
- ③ **Third stage** : Reduction of amplitude of current across the electrodes.
- ④ **Fourth stage** : Dissipation of electron energy at the electrode surface
- ⑤ **Fifth stage** : Thermal dissipation of energy. This stage is essentially due to recombination of plasma ions, active atoms and molecules. These stages explain why coblation is effective if UPPLIED intermittently. This ensures constant presence of stage of vapour film pulsation which is important for tissue ablation.

## Plasma effect on tissue

The effect of plasma is purely chemical and not thermal. Plasma generates H and OH ions. These ions that make plasma destructive. OH radical causes protein degradation. When (oblation is being used to perform surgery the interface between plasma and dissected tissue acts as a gate for charged particles. (oblation causes low temperature molecular disintegration. This causes volumetric removal of tissue with minimal damage to adjacent tissue. (Collateral damage is low).

Temperatures: 40 °C - 70 °C Thermal penetration: Minimal Deep Effects on Target tissue: Gentle removal / Dissolution Effects on surrounding tissue: Minimal dissolution



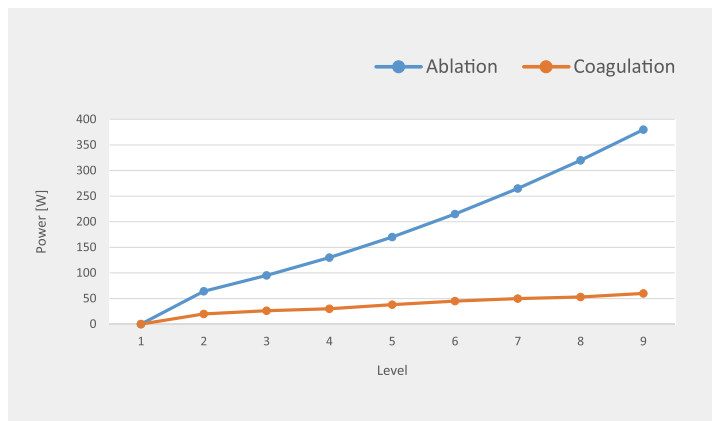
RF Plasma generator made by ENDOVISION is UPPI cable to all surgery as well as all spine and joints. It shows sophisticated signals and diversified levels 1-9 to meet the needs of spine, sports medicine, and ENT.

## Ablation

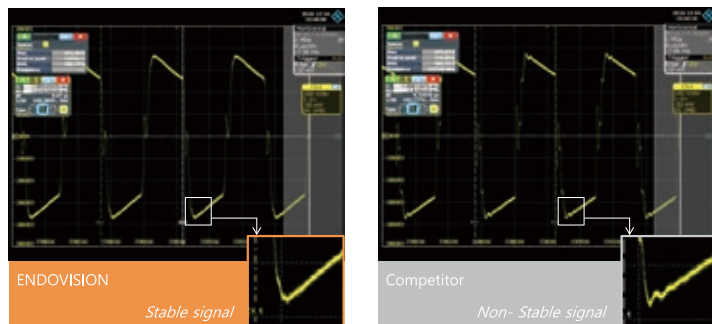
Electrical energy flows through the active and return electrodes, and saline creates a plasma sheath that is precisely concentrated around the electrodes. Plasma sheath consist of large charged particles that can generate sufficient energy for strong oxidation when accelerated by an electric field. The energy generated is so powerful that it breaks the bonds of organic molecules within the tissue and allows the tissue to rapidly dissolve to a molecular and atomic level at a relatively low temperature of 40-70 °C. This product provides rapid and efficient ablation and resection of tissue at relatively low temperatures.

## Coagulation

When electrical energy acts on the tissue, joule heat and electromagnetic wave effects are created around the electrode tips, resulting in immediate coagulation of tissue proteins and sealing of small blood vessels, thus achieving coagulation and hemostasis of the target tissue. The surgical procedure by plasma resection allows efficient hemostasis while preserving mucosa and fibrous tissue. Unlike past high temperature thermal coagulation, plasma technology adjusts the operating temperature to 40-70 °C to minimize thermal damage to normal tissues and coagulate the helical structure of collagen molecules to maintain cell viability.

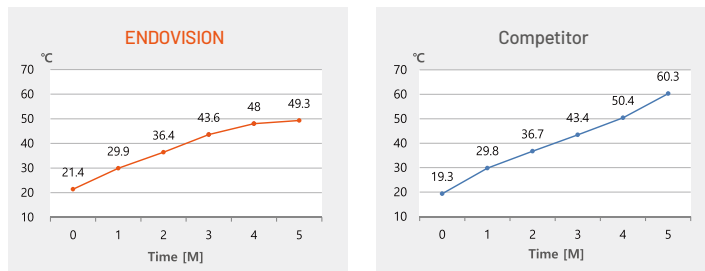


## Stable generation of plasma



Controllers with state-of-the-art technology create a superior plasma layer with fast response. You can precisely adjust the size of the plasma area at levels 1 to 9 by supplying the correct amount of power. Accurate and stable temperature minimizes thermal energy damage to normal tissue. Surgical ablation and coagulation can be performed smoothly.

## Excellent thermal stability



ENDOVISION Probe Temperature Increased 27.9 °C Competitor Probe Temperature Increased 41.0 °C

## Completed product stability and validation through clinical trials



Screening No.	Hospitalization period (days)	op time (h.m)	Bleeding during surgery (mL)	Drainage dose After surgery (mL)	pre op			post op		
					Lumbar	Lt. Leg	Rt. Leg	Lumbar	Lt. Leg	Rt. Leg
SEV-01-01	4	1h58m	30	57	7	2	10	1	0	3
SEV-01-02	5	1h16m	20	23	6	6	2	1	1	0
SEV-01-03	4	1h44m	30	67	2	0	9	2	0	3
SEV-01-04	3	1h51m	50	70	1	3	0	0	1	0
SEV-01-05	3	1h32m	50	53	7	0	8	1	0	1
SEV-01-06	6	1h03m	30	45	8	0	9	2	0	5
SEV-01-07	4	1h45m	30	99	8	8	5	2	1	1
SEV-01-08	3	1h31m	50	64	6	2	8	2	1	5
SEV-01-09	3	1h12m	50	52	3	0	3	3	0	4

Dr. Evaluation report : ENDOVISION Plasma generator with probe was very easy to use without any special side effects and resistance. There was no problems in the operation progress, and complications with zero % of nerve injury and neuropathic pain. Clinical improvement from successful operation was excellent.

## Spinuss RF console

