Cautery Settings

Combined Small Group Sessions

Endoscopy Skills Day 2026

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Objectives

At the end of this session, the participant will be equipped to:

- appreciate the basic concepts of electrosurgery
- understand the basic function of the electrosurgical unit (ESU)
- understand how to safely and effectively use Electrosurgery in GI endoscopy

CanMEDS Roles Fulfilled

X	**Medical Expert** (as *Medical Experts*, physicians integrate all of the CanMEDS Roles, applying medical knowledge, clinical skills, and professional values in their provision of high-quality and safe patient-centered care. *Medical Expert* is the central physician Role in the CanMEDS Framework and defines the physician's clinical scope of practice.)
X	**Communicator** (as *Communicators*, physicians form relationships with patients and their families that facilitate the gathering and sharing of essential information for effective health care.)
	Collaborator (as *Collaborators*, physicians work effectively with other health care professionals to provide safe, high-quality, patient-centred care.)
	Leader (as *Leaders*, physicians engage with others to contribute to a vision of a high-quality health care system and take responsibility for the delivery of excellent patient care through their activities as clinicians, administrators, scholars, or teachers.)
	Health Advocate (as *Health Advocates*, physicians contribute their expertise and influence as they work with communities or patient populations to improve health. They work with those they serve to determine and understand needs, speak on behalf of others when required, and support the mobilization of resources to effect change.)
X	**Scholar** (as *Scholars*, physicians demonstrate a lifelong commitment to excellence in practice through continuous learning and by teaching others, evaluating evidence, and contributing to scholarship.)
	Professional (as *Professionals,* physicians are committed to the health and well-being of individual patients and society through ethical practice, high personal standards of behaviour, accountability to the profession and society, physician-led regulation, and maintenance of personal health.)

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Endo Skills 2025 – Disclosure of Commercial Support

- Endo Skills is presented by the Alberta Society for Endoscopic Practice (ASEP)
- ASEP: not for profit organization, whose goal is to provide education, resources and collaboration for endoscopists and their teams
- Endo Skills planning is independent from the exhibitors
- ASEP covers expenses of speakers and provides gift+/- small honorarium to speakers and planning committee

Endo Skills 2025 – Managing Sources of Potential Conflict

- Endo Skills Planning Committee: oversees the program's content development to ensure accuracy and balance.
- Information and recommendations are evidence and/or guidelines-based, and opinions of the independent speakers will be identified as such.
- Program developed in accordance to ethical standards meeting Cert+ guidelines.

Personal Disclosures (Past 36 Months)

- **Personal Fees:**
  - Boston Scientific (consultancy fees)

- **Research Funding:**
  - Canadian Institutes of Health Research (CIHR)
  - American Society for Gastrointestinal Endoscopy (ASGE)
  - AHS Digestive Health Strategic Clinical Network (DHSCN)

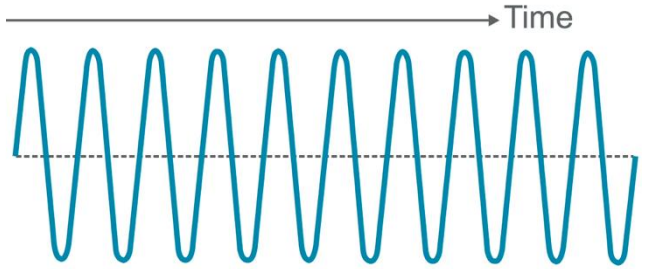
Basics: Electrosurgery vs. Electrocautery

- **Electrocautery**
  - Uses **DC** to heat a probe
  - Probe then applies heat **to** a target tissue
  - Often hand-held devices

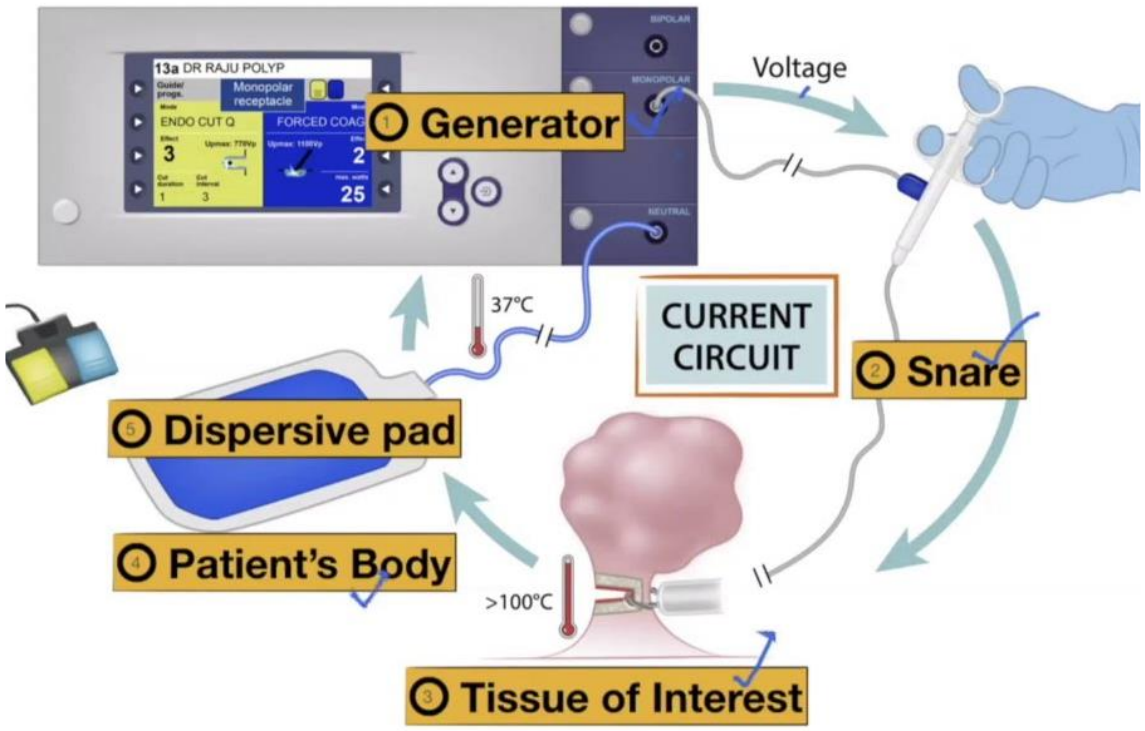
- **Electrosurgery**
  - Uses high-frequency **AC**
  - AC passes **through** patient's body/ tissue
  - Requires ESU

Principles of Electrosurgery

- Intracellular conversion of:
  - electromagnetic energy to
  - kinetic energy to
  - thermal energy



The Clinical Circuit



- Current – flow of electrons through the electrical circuit
- Voltage – electrical force pushing current around the circuit, through varying degrees of tissue resistance
- Resistance (impedance) – produced by the tissue being treated and produces heat
  - Resistance of skin > bone > fat > muscle > bowel wall > blood

Cutting vs Coagulation

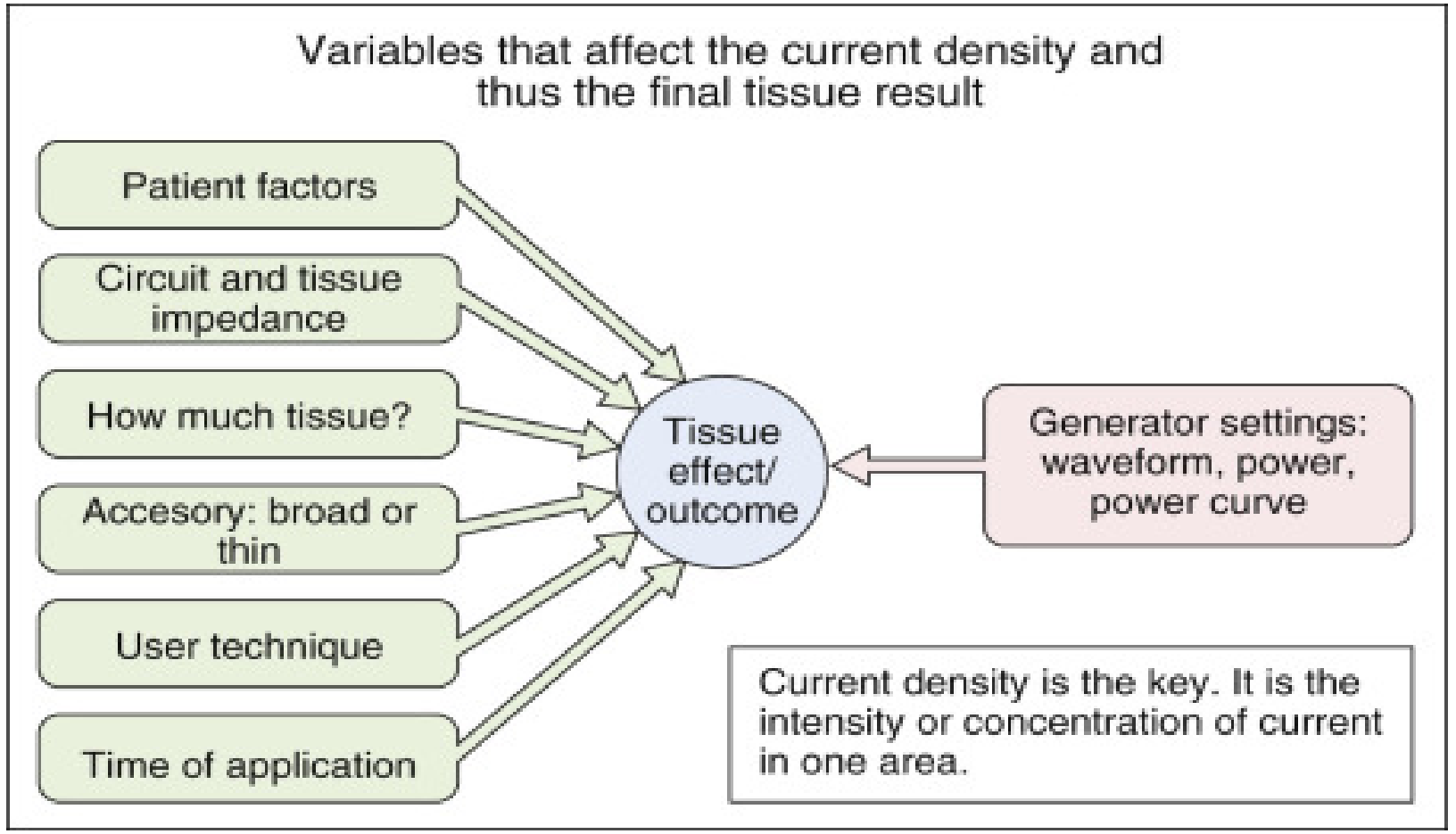
Cutting (Vaporization)

- Tissue is rapidly heated to > 100° C
- Fluid vaporizes abruptly and cells burst

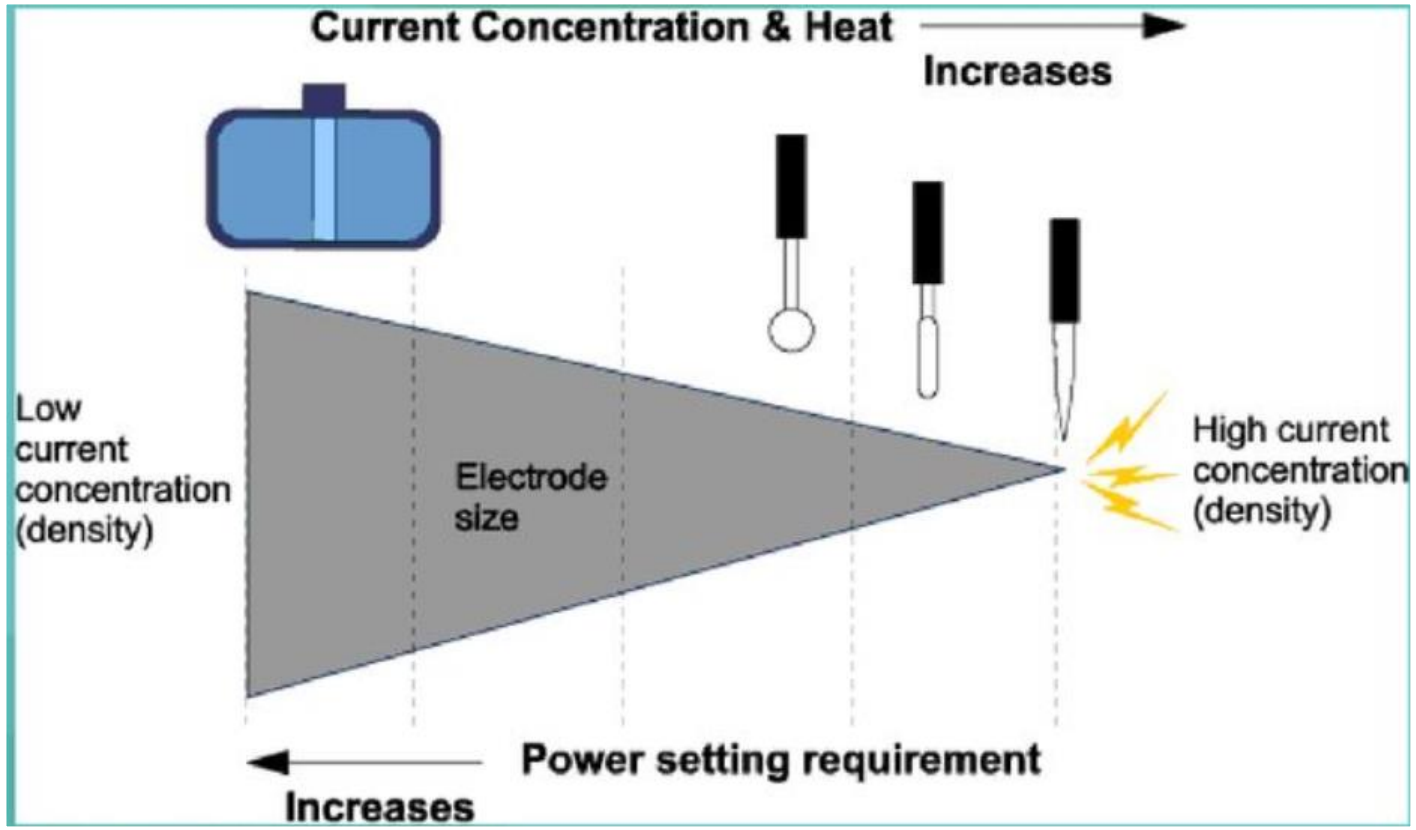
Coagulation (Desiccation)

- Tissue is heated more slowly (60-90° C), cells dehydrate and shrink

Variables Impacting Tissue Effects



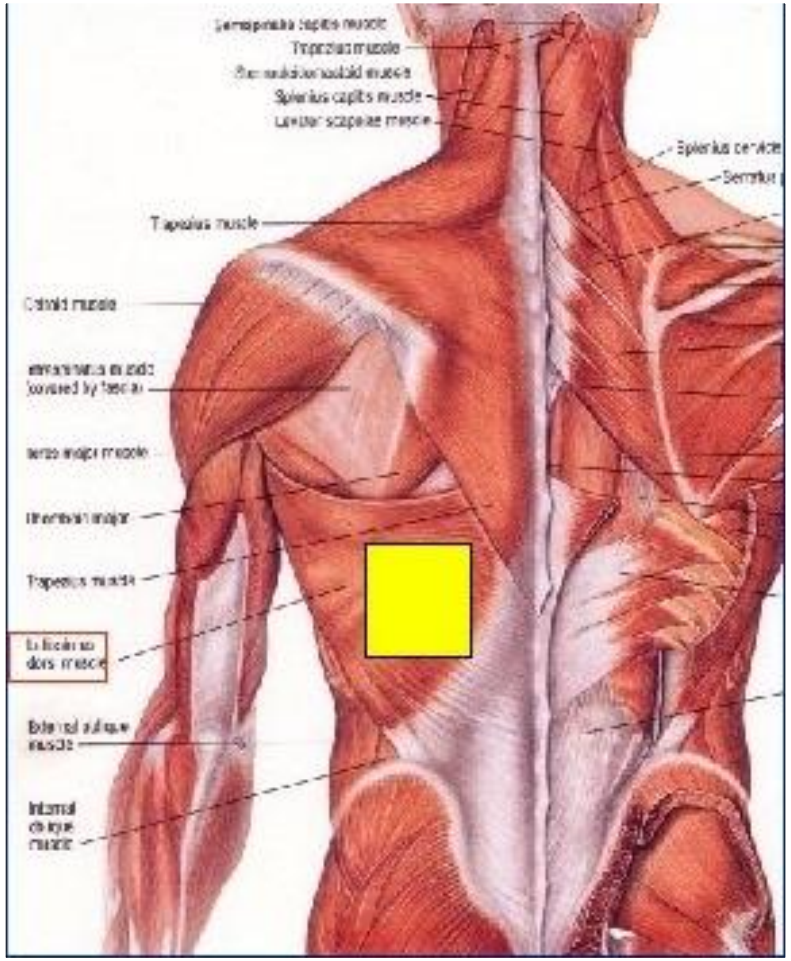
Current Density



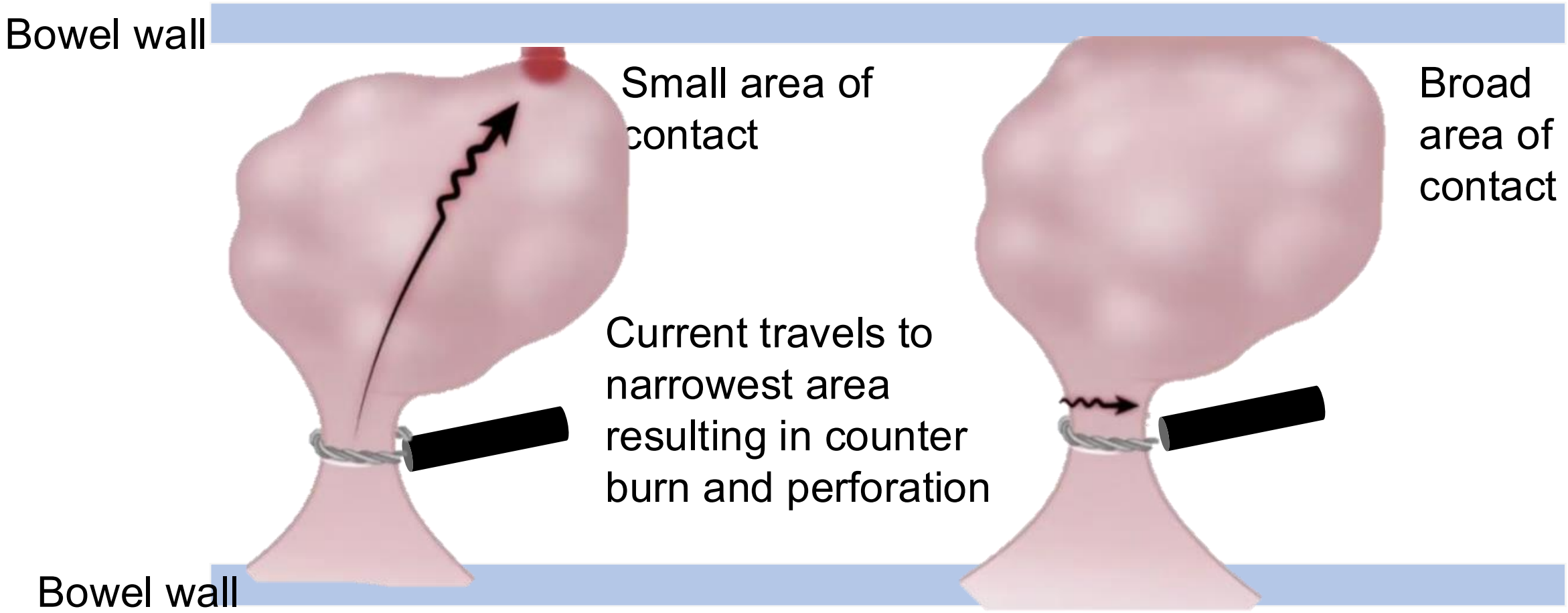
- The amount of current concentration (intensity of heat generation) at a given area.
- The smaller the active electrode, the more concentrated the energy
- The grounding pad is a neutral electrode dispersing the energy over a larger surface area
- That is why proper grounding pad placement is so important

Grounding Pad Considerations

- The properties of an ideal grounding pad location are:
  - Well-vascularized area with muscle mass
  - As close to the procedure site as possible
  - Examples: flank, thighs
  - Away from body prominences, scars, hairy sites, adipose tissue, metal implants
  - Good skin apposition
- Other safety considerations:
  - Remove jewelry and watches
  - Ensure patient is not touching metal railings

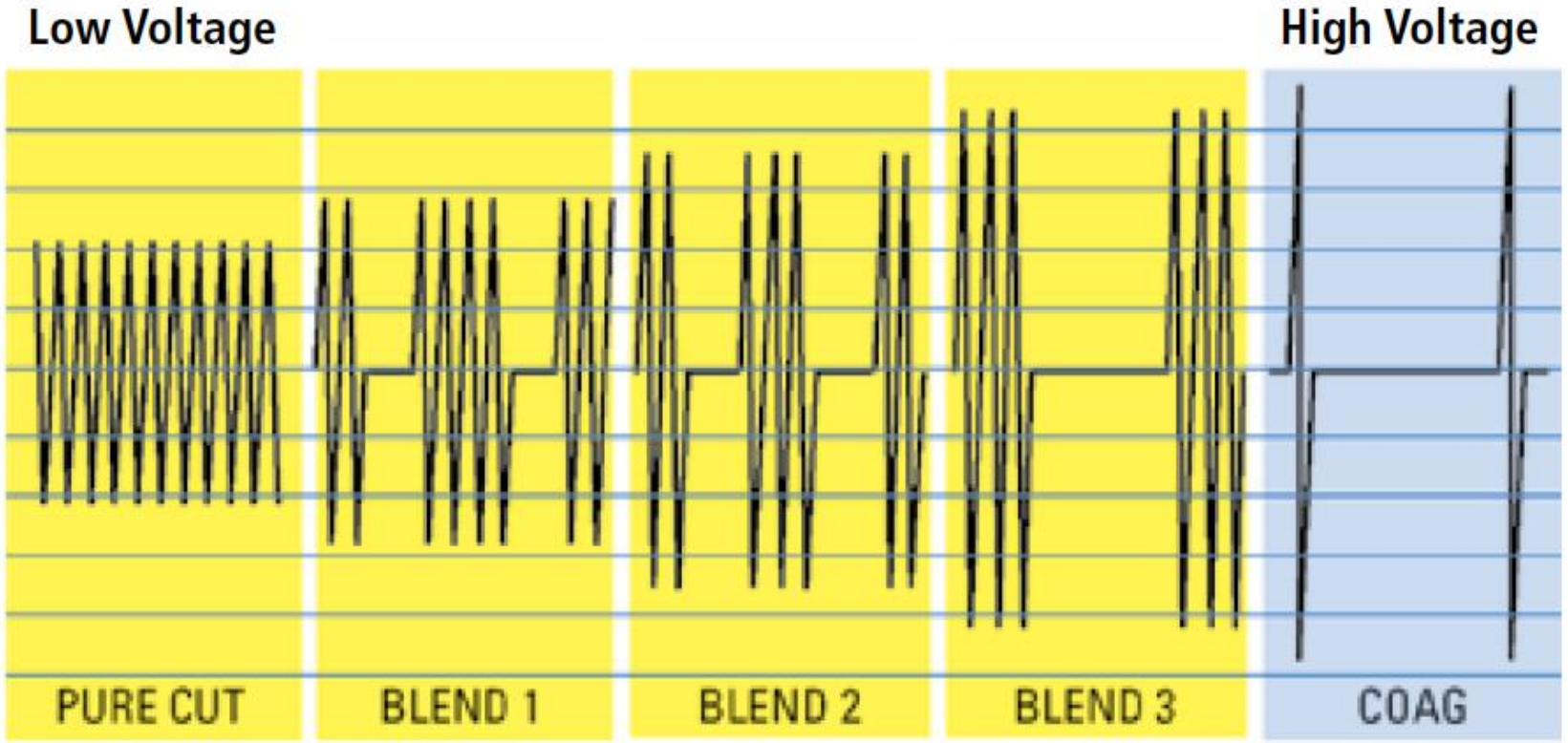


Polypectomy Considerations

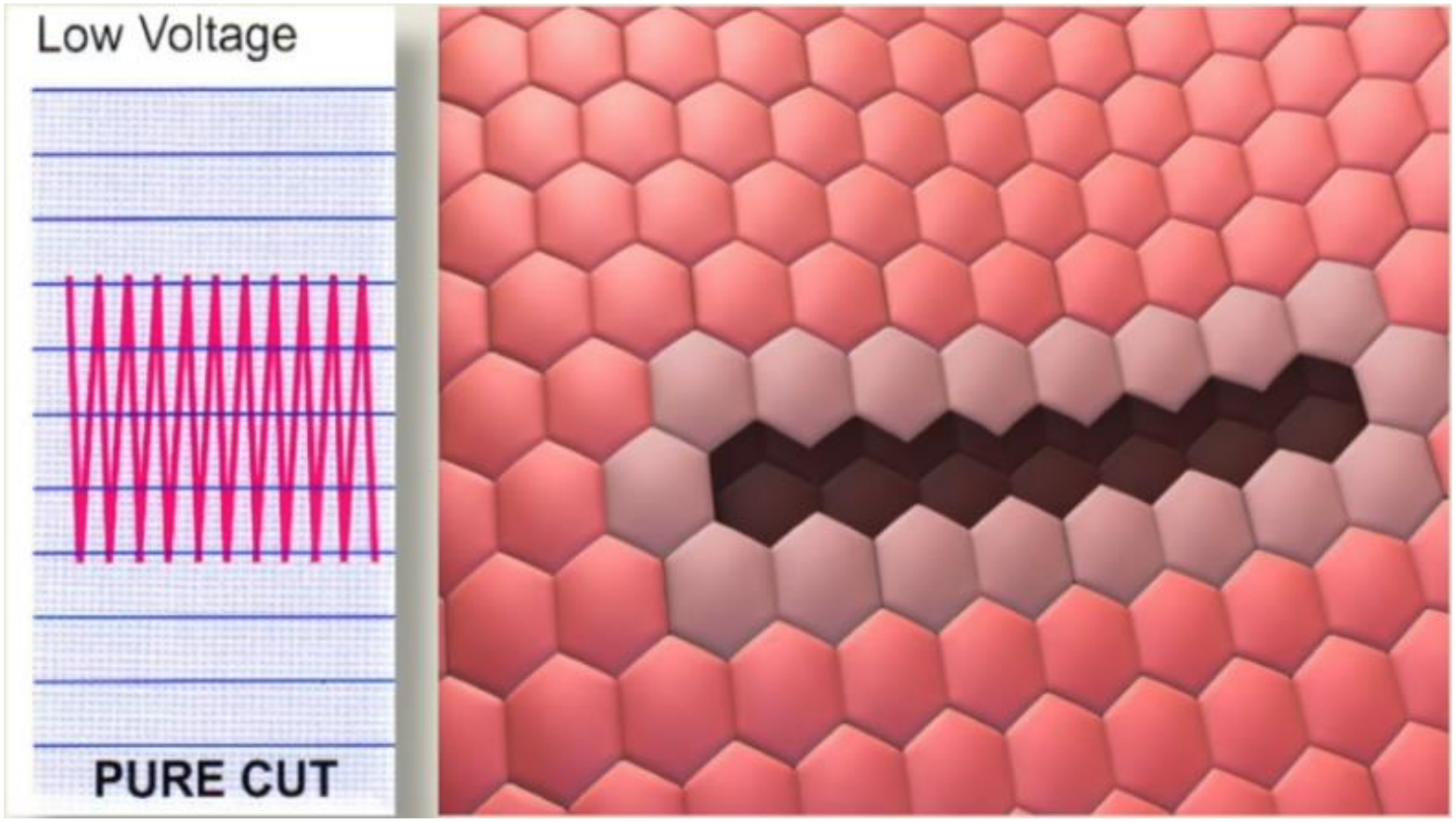


Waveform Modification and Tissue Effects

Duty Cycle: % of time current is ON vs OFF

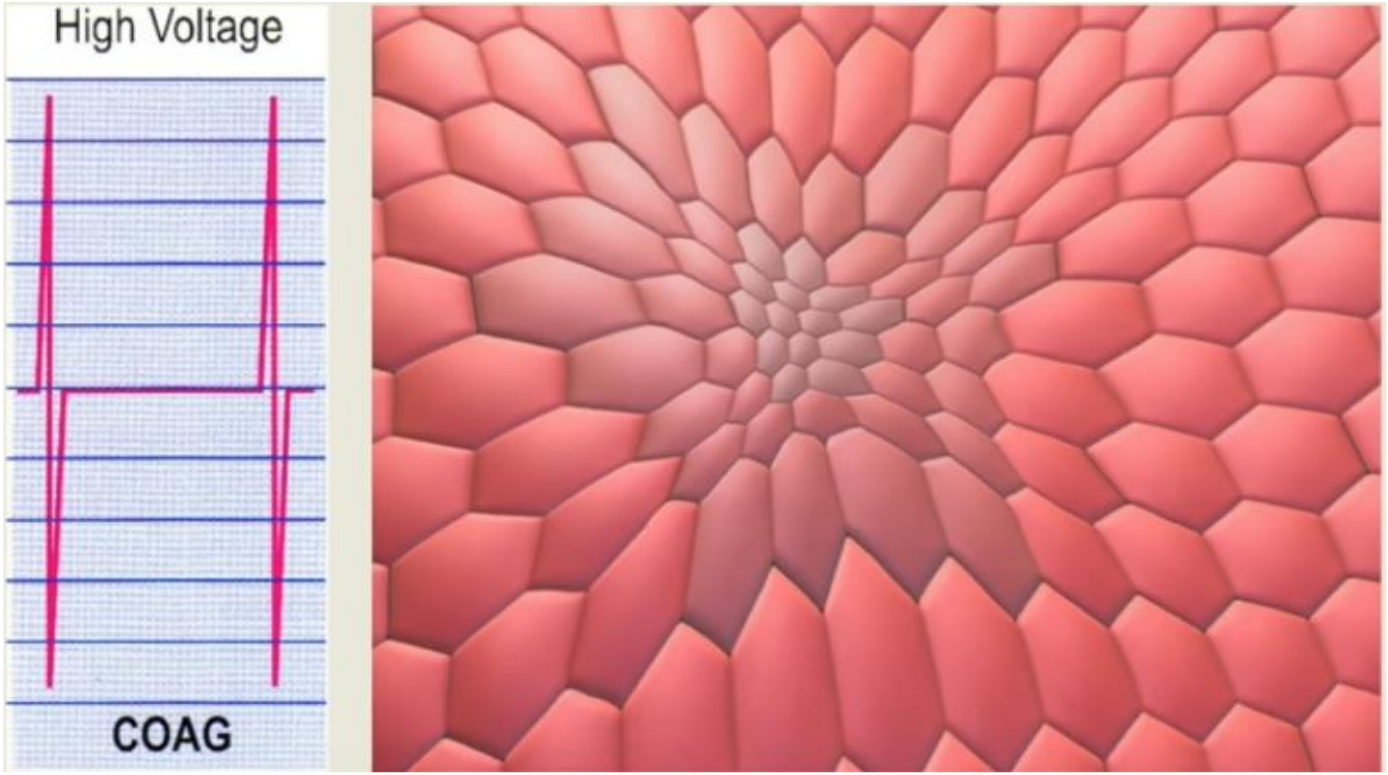


Cutting Current



- Cut current quickly raises cell water temperature to > 100°C
- Tissue fluid vaporizes
- Tissue structure ruptures
- Cleavage plane is created = clinical “CUT”

Coagulation Current



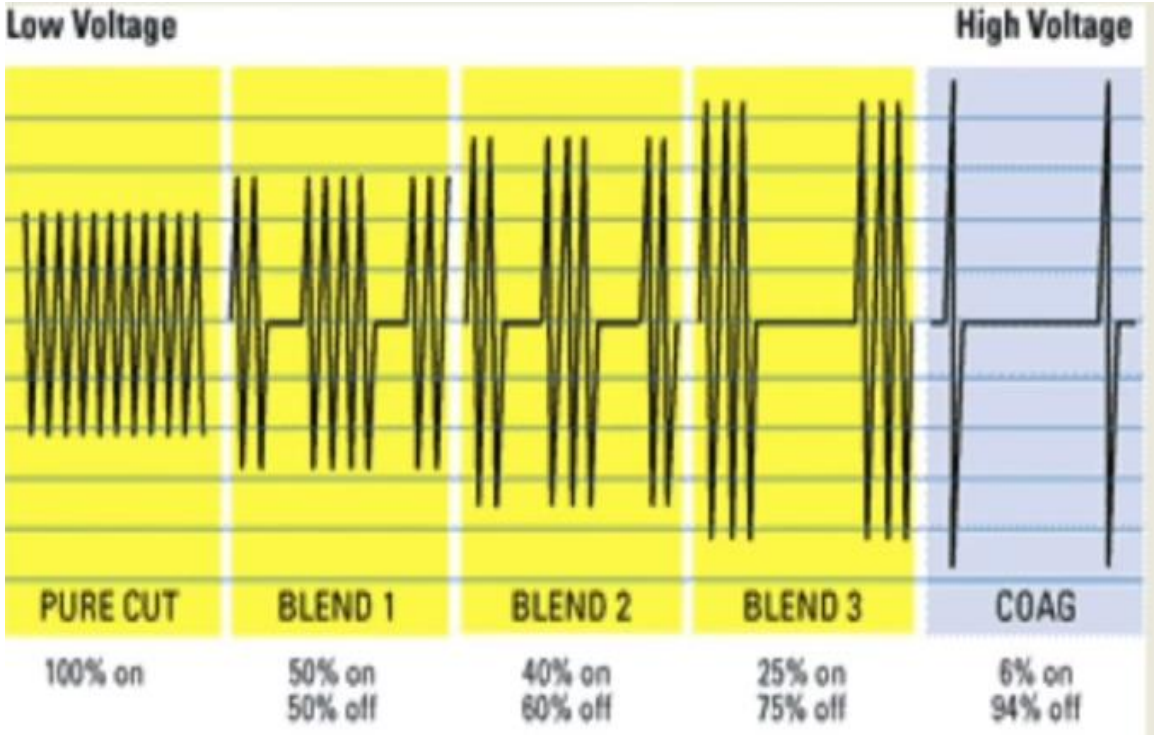
- Waveform with spikes of high voltage, followed by rest period
- Rest allows the cellular protein to slowly denature (dehydrate)
- Slowly raises cell water temperature to 60-100°C
- Coagulation occurs
- Hemostasis is due to shrinking tissue = clinical “COAG”

Blended Current

Duty Cycle: % of time current is ON vs OFF

HIGH = Cut

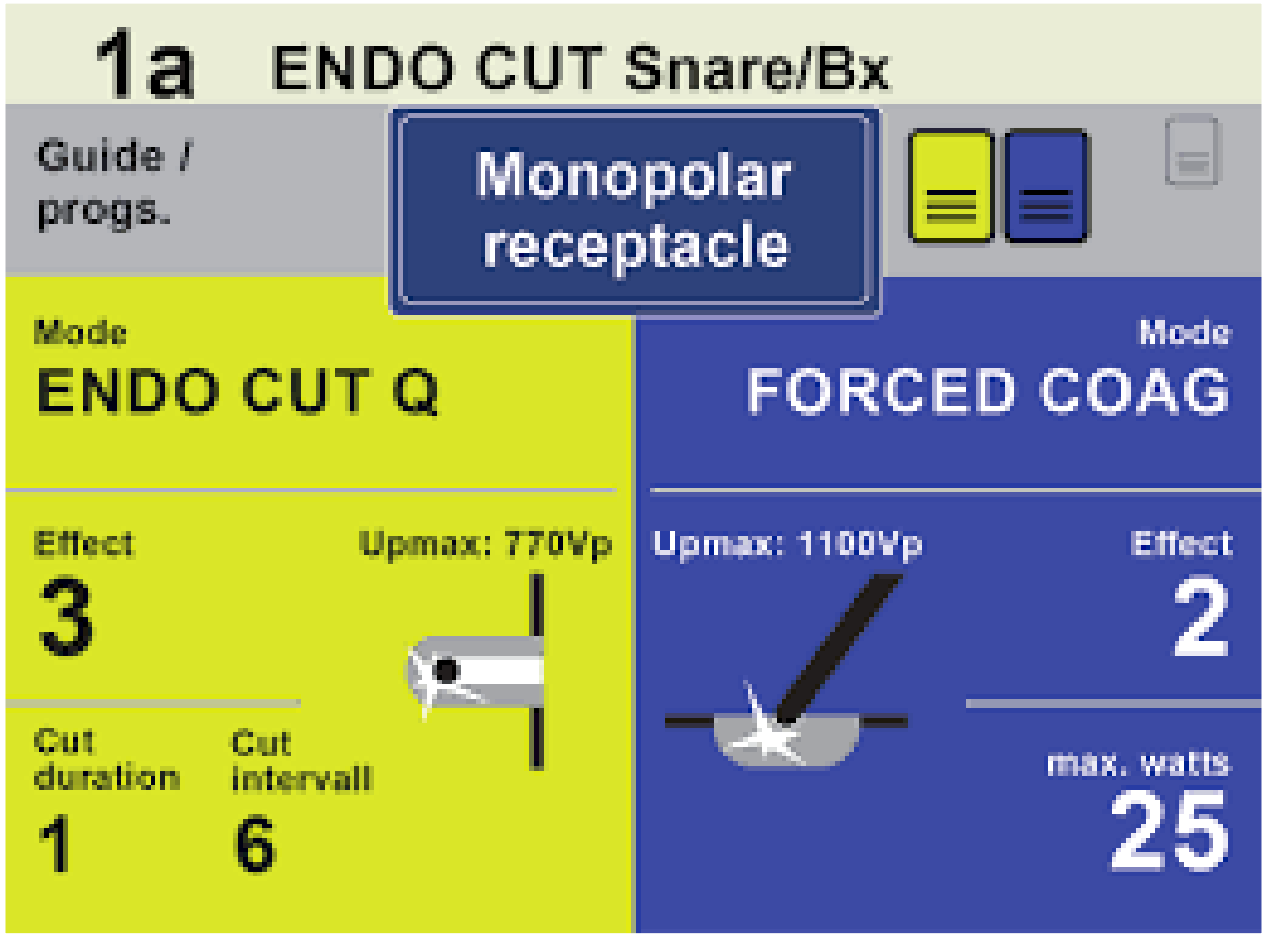
LOW = Coag

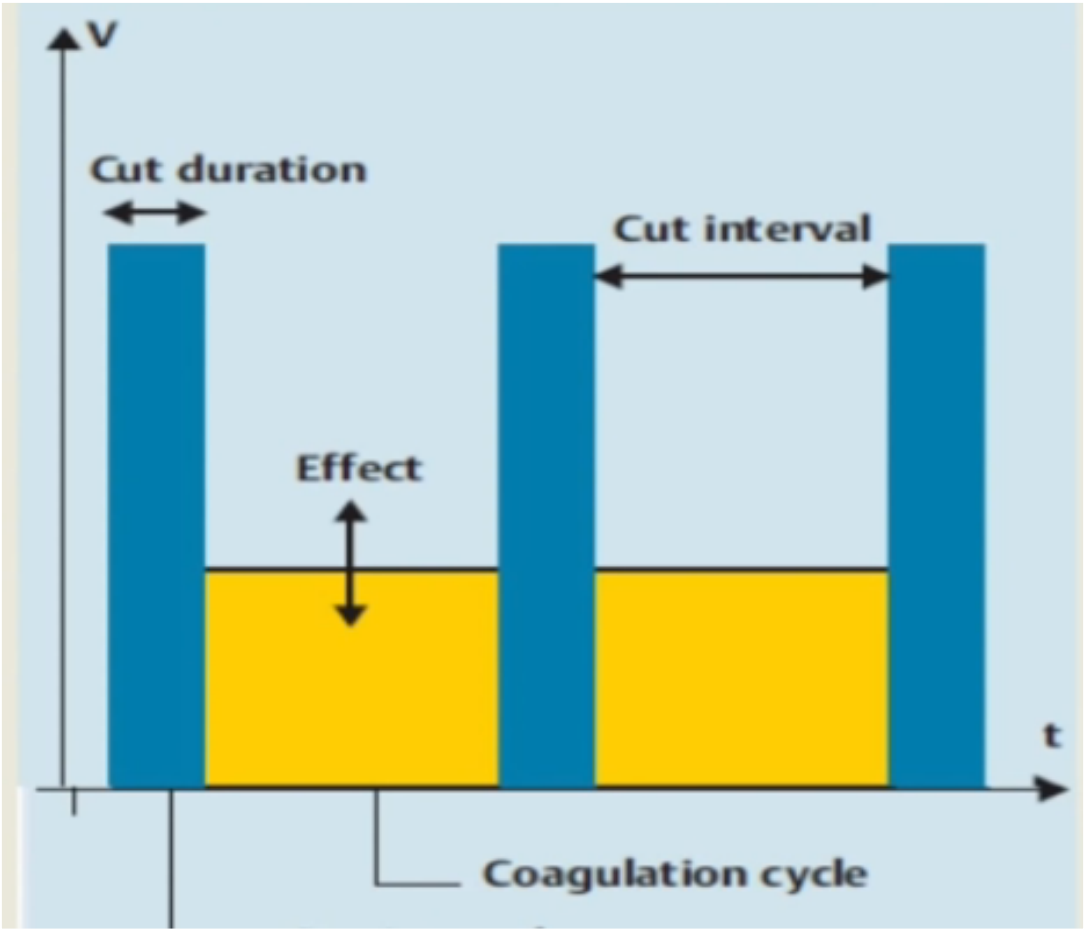


BLEND CUT
Range: 12-80% "on"
Usual:25-50% "on"

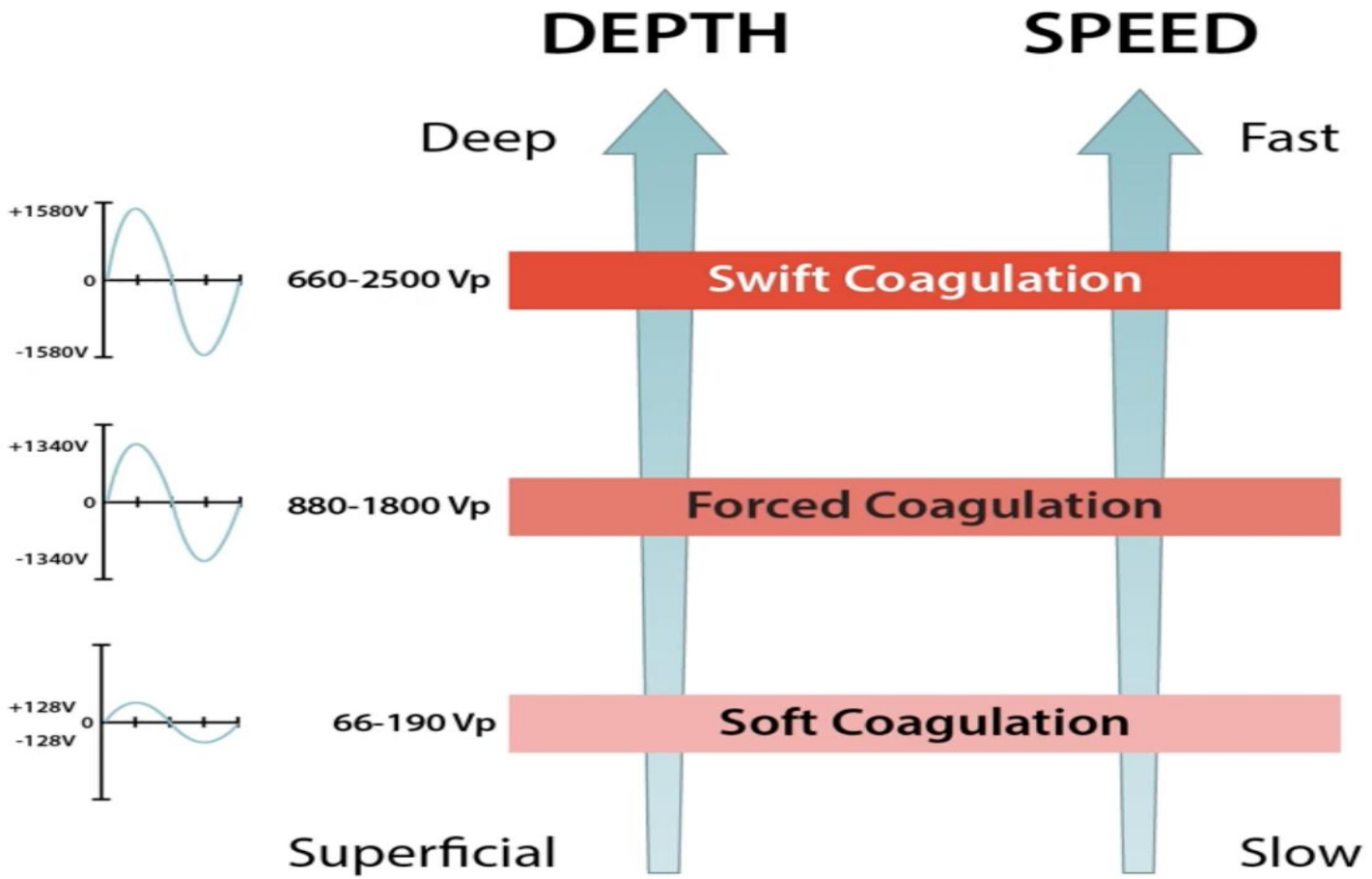
Do not tap the pedal!

ESU ‘Programs’





Coagulation Modes



Thank you!

Questions?