

BRAIN RESEARCH LABORATORIES

Histology • Slides • Boxes • Equipment
Tele: (617) 965-5544 • Fax: (617) 965-6220
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INSTRUCTIONS

USE AND CARE OF YOUR MICROTOME KNIFE

BEFORE USING YOUR MICROTOME KNIFE

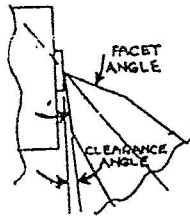
- A. Your microtome knife has been coated with an oil mixture to prevent rust and corrosion when not in use.
- B. Before using your knife, take a lint-free facial tissue saturated in either zylene, benzene, or acetone to remove the protective oil coating on the knife.
- C. Use a dry, lint-free, facial tissue to wipe your knife clean. **DO NOT USE GAUZE** or any other coarse material, it will destroy the edge of your knife.
- D. Your knife has already been stropped and is now ready for immediate use.

CARING FOR YOUR MICROTOME KNIFE

- A. Keep the edge of your knife clean at all times.
- B. Spray or brush any household oil on your knife to prevent rust when not in use.
- C. Store your knife in its case to prevent oxidation from occurring.
- D. If you are using a lab sharpener, periodically send your knife out to be professionally reconditioned.
 - 1. Extremely wide facets result from the continuous use of a lab sharpener. The optimum bevel angle becomes distorted as a result of the facet changes. This diminishes your cutting performance.
 - 2. Double facets may develop on your knife's edge, creating distorted sections.

HINTS FOR USING YOUR MICROTOME KNIFE

- A. To maximize the sharpness of your knife's edge, use an old knife to trim your first block, or use the extreme end of your new or reconditioned knife.
- B. Continuously remove the paraffin, or other embedding medium, on the front and back of your knife to maximize your cutting performance.
- C. Depending on the texture of the tissue you have been cutting, you may be able to use the other side of your knife for extended use.
- D. Setting your knife at the proper clearance angle will obviously not only enhance your output but it will also extend the life of your knife's edge.
- E. Maintain a sharp edge on your knife. Even the most highly skilled technologists cannot overcome the handicaps created from using a dull or bruised knife.
- F. Based on the facet/bevel angle created in our reconditioning process, we recommend a clearance angle between 6 and 8 degrees.



- G. When your knife is reaching its dimensional maturity, i.e., the width of the knife's surface is less than $\frac{7}{8}$ of an inch, proper knife stability is difficult to achieve in the holder. Placing a hexagonal pencil at the base of the knife within the holder will act as a filler and provides it with the support required.

**Microtomy is an Art
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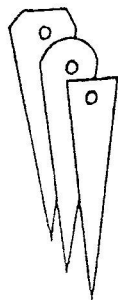
Skilled Technologists

Well Maintained Microtomes

Sharp, Quality, Microtome Knives

Properly Prepared Materials

Excellent Procedures



MICROTOMY

SECTIONING TROUBLE-SHOOTING GUIDE

<u>PROBLEM</u>	<u>CAUSE</u>	<u>SOLUTION</u>	<u>PROBLEM</u>	<u>CAUSE</u>	<u>SOLUTION</u>
Ribbon does not form	Room temperature too cold	Warm knife slightly	Sections crumble, specimen may tear out (cont'd)	Incomplete infiltration with embedding medium	Infiltrate with paraffin and re-embed
	Paraffin too hard	Use lower melting point paraffin		Extended time in paraffin bath or bath too hot	Check thermostat controls of paraffin bath
	Knife angle too great	Tilt knife less		Clearing fluid used	Substitute chloroform or toluene instead of xylene for clearing
	Sections too thick	Cut thinner sections			
	Dull knife	Sharpen knife			
Crooked ribbons	Blocks not trimmed parallel	Re-embed in mold so edge of block is parallel to knife edge	Split ribbon or lengthwise scratches in ribbon	Nicks in knife	Sharpen knife
	Irregular knife edge	Use another part of knife		Too much tilt	Use less tilt so knife will cut, not scrape
	Irregular paraffin softness/hardness of one side of block	Re-embed tissue and stir melted paraffin		Knife edge dirty or lint on edge	Clean both sides of knife
	Block temperature uneven due to location near heat source	Relocate microtome or cool block in water		Object too hard for paraffin	Use celloidin embedding
				Hard particles in paraffin	Re-filter paraffin
Sections are irregular, skipped or thin	Knife tilt insufficient or excessive	Adjust knife holder to a 6-8 degree clearance angle	Knife rings on upstroke and sections are scratched	Crystals from mercuric chloride fixation	Washing was insufficient
	Clamping set screws are loose	Tighten set screws		Calcareous or silicious particles	Decalcify or desilicify
	Knife block holder loose	Tighten clamp		Knife tilt too great	Change knife tilt
	Microtome out of adjustment	Check by manufacturer		Material is too hard	Soak in water to soften
Sections are compressed, wrinkled or jammed together	Dull knife	Sharpen knife	Sections lifted from knife on upstroke	Material too hard for paraffin method	Try celloidin
	Room too warm	Cool block in water		Not enough knife tilt	Increase knife tilt
	Knife tilt too slight	Increase tilt		Knife dull	Sharpen knife
	Knife edge gummed with paraffin	Use lint-free tissue and xylene to clean		Room too warm or paraffin too soft	Try harder paraffin, cooler room or cool block
	Cutting too fast	Cut thin sections slowly and evenly			
Sections crumble, specimen may tear out	Insufficient dehydration of material	Salvage rarely possible	Sections stick to knife	Knife edge dirty	Clean with xylene
	Insufficient clearing of material	Return tissue to several changes of paraffin		Knife tilt too little	Increase tilt
				Knife dull	Sharpen knife
			Scratching noise during cutting	Material may be too hard	Try celloidin embedding

<u>PROBLEM</u>	<u>CAUSE</u>	<u>SOLUTION</u>	<u>PROBLEM</u>	<u>CAUSE</u>	<u>SOLUTION</u>
Undulations in the surface of the section	Set screws loose	Tighten set screws	Sections fall out of matrix or show compression different from embedding medium frame	Embedding medium inadequate	Change to different medium for embedding
	Knife holder loose	Tighten clamp			
	Excessive knife tilt	Decrease knife tilt			
Sections are smeared, deformed	Dull knife	Sharpen knife	Sections have mushy appearance	Insufficient dehydration	Salvage rarely possible
Sections fly and stick to parts of microtome or other nearby objects	Static electricity	Increase humidity	Knife does not hold its edge	Angle too severe	Adjust clearance angle to 6-8 degrees
		Boil water in a pan		Cutting too fast	Slow cutting speed
		Ground microtome to a water pipe		Paraffin too hard	Alter consistency of paraffin
		Ionize air		Cutting hard tissue	No solution, natural wear

HELPFUL SECTIONING TIPS

Section Quality

Section quality is determined more by the condition of the knife and the clearance angle, than by any other factors.

Clearance Angle

Based on the bevel angle created in the manufacturing and reconditioning process, a clearance angle between 6 and 8 degrees is recommended.

Maximizing Cutting Performance

Maintain a sharp edge on your knife. Even the most highly skilled technologist cannot overcome the handicaps created from using a dull or bruised knife.

Knife Cleanliness

Continuously remove the paraffin or other embedding medium, from the front and the back of your knife, to achieve optimum section quality.

Cutting Speed

The cutting speed for cutting good paraffin sections is a rate at which the microtome drive wheel rotates approximately one revolution per second.

Dimensional Maturity

When the width of the knife's surface is less than 7/8 of an inch, proper knife stability is difficult to achieve and the knife should be replaced.

Knife Support

When your knife is approaching its dimensional maturity, placing a hexagonal pencil at the base of the holder will act as a filler and provide your knife with the support required for stability.

Reversing Cutting Edge

Use the opposite side of your knife if section quality is not acceptable. This procedure may also extend the use-life of your knife.

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