Nerve biopsy has high chance of being NONINFORMATIVE:
1. Limited repertoire of pathological findings
2. Limited amount of nervous tissue available for examination

Nerve biopsies are generally useful only in:
1) differentiation – segmental demyelination vs. axonal degeneration (when clinical, laboratory, and electrophysiological examinations are nondiagnostic).
2) inflammatory neuropathies
3) vascular conditions (affecting blood supply of nerve) – vasculitis, cholesterol emboli, malignant angiopodendothelioatosis (intravascular lymphoma).
4) amyloidosis
5) some neoplasms
6) some genetic disorders (e.g. metachromatic leukodystrophy, Krabbe's disease, adrenoleukodystrophy, infantile neuronal dystrophy, neuronal ceroid lipofuscinosis, Lafora disease) – both CNS and PNS are affected.

N.B. generally biopsy is performed in mononeuropathy multiplex (vs. distal symmetric polyneuropathy – biopsy is often uninformative), palpably enlarged nerves.

TECHNIQUES
A) FULL-THICKNESS biopsy – complete transection of nerve to remove segment
• technically easier to perform.
• preferable when pathological evaluation should include both nerve fibers and surrounding connective tissue and vascular structures.
B) FASCICULAR biopsy - longitudinal dissection of nerve to remove segments of only one or several fascicles (sparing at least portion of nerve) – favored when larger nerves are biopsied.

Sample amount is varied (2-3 cm segment of full-thickness nerve or fascicles is adequate).

TESTING METHODS

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<tr>
<th>Technique</th>
<th>Fixation</th>
<th>Use</th>
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<tbody>
<tr>
<td>Routine light microscopy</td>
<td>Formalin, paraffin</td>
<td>Survey (vasculitis, amyloidosis)</td>
</tr>
<tr>
<td></td>
<td>Glutaraldehyde, paraffin</td>
<td>Survey</td>
</tr>
<tr>
<td>Frozen specimen light microscopy</td>
<td>None</td>
<td>Special stains (immunohistochemically metachromasia)</td>
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<tr>
<td>Teased nerve examination</td>
<td>Glutaraldehyde, osmium</td>
<td>Myelin internodes, thickening of myelin sheaths (tomacula)</td>
</tr>
<tr>
<td>Electron microscopy</td>
<td>Glutaraldehyde, osmium, resin</td>
<td>Fine structure (most important morphologic alterations)</td>
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</table>

* time-consuming procedure not done routinely

• cross sections - for morphometric studies (i.e. scoring of abnormalities).
• longitudinal sections - for focal processes (irregularly distributed – may be missed in cross section).

PATHOLOGICAL FINDINGS

AXONAL neuropathy - marked depletion of fibers, interstitial fibrosis, ± myelin debris or regeneration of axons.
• most likely caused by toxic or metabolic disorder.

Segmental demyelination & remyelination - thinly myelinated fibers and onion bulbs.
• most often in immunologically mediated or hereditary neuropathy.
• may be proved by electron microscopy or analysis of teased myelinated nerve fibers.

BIBLIOGRAPHY for “Nerve Biopsy” ➔ follow this LINK ➔