**INTRAVENOUS CHEMOTHERAPY OF TUBERCULOSIS**

**Intravenous ANTI-TB drugs by YURIA-PHARM are lifesaving for patients with severe forms of TB**

The principal indications to intravenous TB chemotherapy are the following:
- Poor general health status of the patient (severe course of TB/patients in intensive care units);
- Impaired GIT absorption of drugs/malabsorption syndrome (the latter may be suspected in GIT comorbidities and/or low efficacy of front-line therapy);
- TB patients with prior gastrointestinal surgical procedures;
- Pre- and postoperative period (surgical interventions for TB);
- Advanced tuberculosis with massive tissue involvement (caseous pneumonia, disseminated TB, miliary TB, extrapulmonary TB);
- CNS tuberculosis;
- Adverse gastrointestinal reactions to oral anti-TB drugs (ATDs) (vomiting, nausea and chronic gastritis).

The additional indications to intravenous TB chemotherapy are the following:
- Intensive phase of TB therapy in patients with positive sputum;
- The preferences of the patient;
- Low patient compliance.

**Contraindications to intravenous TB therapy:**
- Stage II-III progressive heart failure;
- Stage II-III hypertension;
- Coronary artery disease;
- Haemorrhagic conditions;
- Acute CNS disorders;
- Severe decompensated diabetes mellitus;
- Stage IV-V chronic kidney disease;
- Venous embolism and thrombosis;
- Phlebitis.

The technique of intravenous TB therapy:
- Patient rooms equipped to perform intravenous infusions of medical products (hooks/stands to suspend intravenous bottles/bags with drugs);
- At least one IV-certified nurse available per 60 patients;
- Monitoring of patient’s condition during the infusion;
- Intramuscular injections are to be performed at least 1 hour prior to the infusion;
- Oral drugs are to be given at least 2 hours prior to the infusion;
- The drug’s expiry date must be verified prior to infusion;
- The solution must be warm (ideally 30-33°C), transparent, impurity-free;
- It is best to administer the drug using a thin needle;
- If the patient does not have an indwelling IV catheter, then the drug has to be administered using alternating veins;
- Infusion rate: not more than 60 drops per minute;
- The very first administration has to be half of the target daily dose;

**The special considerations for intravenous TB therapy**
- 100% controlled therapy (the best variant of DOT)
- 100% bioavailability of drugs
- The possibility of precise dosing;
- The possibility to reduce the number of oral drugs and related negative sensations;
- Reducing the quantity of adverse effects of therapy (especially GI effects)
- Maximal intensity of therapy.
Methods of IV administration of the main anti-TB drugs:

<table>
<thead>
<tr>
<th>Drug</th>
<th>Recommended dosage</th>
<th>Notes</th>
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<tbody>
<tr>
<td></td>
<td>Every day regimen</td>
<td>3 times a week regimen</td>
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<tr>
<td></td>
<td>Dosage (mg/kg) Max. (mg)</td>
<td>Dosage (mg/kg) Max. (mg)</td>
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<tr>
<td>Isoniazid (BITUB 10% 5 ml)</td>
<td>5 (4-6) 300streams (8-12) 900streams</td>
<td>The entire dose is infused in 100-200 mL of 5% dextrose (DSW) or 0.9% NaCl.</td>
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<tr>
<td>Rifamycin (RIFONAT 30 mg/ml 5, 15, 20 ml)</td>
<td>10 (8-12) 600</td>
<td>10 (8-12) 600</td>
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<tr>
<td>Ethambutol (INBUTOL 10% 10, 20 ml)</td>
<td>15 (15-20) 1600</td>
<td>30 (25-35) 2000</td>
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<tr>
<td>Levofloxacina (LEFLOCIN 5% 100 ml, 150 ml)</td>
<td>Average adult dose is 750-1000 mg/day</td>
<td>The entire daily dose may be divided into a morning and an evening dose</td>
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<tr>
<td>PAS (PASKONAT 3% 400 ml)</td>
<td>150-200</td>
<td>12 g</td>
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</table>

- Patients with HIV/AIDS co-infection use only every day regimen of the drugs.
- From the very start of treatment all patients receive pyridoxine 25 mg/day to correct pyridoxine deficiency caused by isoniazid administration.


Intravenous administration of anti-tuberculosis drugs is recommended during the intensive phase of tuberculosis treatment (1-2 months).

Possible complications of intravenous drug therapy

Phlebitis:
- chemical
- mechanical
- bacterial

Infiltration:
- due to fluid outflow into the tissues
- nerve compression requiring a fasciotomy

Extravasation:
- an inadvertent exposure of perivascular tissues to an aggressive medical product

Complicated Infected phlebitis – cellulitis or sepsis

The causes of infectious complications:
- wrong choice of injection site;
- failure to adhere to sterility guidelines;
- The IV catheter in place for excessive time – must be replaced every 96 hours;
- catheter contamination.

Prevention of complications

Hand-washing
- Adherence to sterile infusion technique;
- Correct choice of injection site;
- Catheter sizing
- Regular inspections of injection site(s) (every 2 hours when in an in-patient setting)
- Encourage reporting of any discomforts by the patients.

The sites NOT recommended for infusions:
- the veins located below the previously infiltrated veins;
- the veins located below the phlebitis site;
- sclerotic or thrombosed veins;
- skin areas with signs of inflammation, skin disease, bruises and damage;
- upper extremity with oedema, thrombi and/or infection; the upper extremity homolateral to radical mastectomy,
- the upper extremity with an arteriovenous shunt or fistula.