## Leflunomide for patients within adult services

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| Version: | RDTC v1.1 | Replaces version: | RDTC v1.0 |
| Clinical content last reviewed: | December 2023 | Next review date: | December 2025 |

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| **Version** | **Date published** | **Changes since previous version** |
| RDTC v1.0 | 10/04/24 | Hyperlinks and references updated to current versions  Advice on shingles vaccine updated to reflect new national schedule  Section 5: added blood pressure and weight monitoring, and measures for those taking concomitant methotrexate, in line with BSR guidance |
| RDTC v1.1 | 26/11/24 | Advice on shingles vaccine clarified to reflect potential eligibility of patients aged 50 years or older taking immunosuppressive therapy |

**Local review and adoption**

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| **Local approval** | **Date** |
| Local content added |  |
| Approved for use by xx ICB |  |
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Clinical content has been reviewed and updated by the RDTC on the date indicated above. Every effort is made to keep the content up to date. These templates are provided to the North West and North East and Yorkshire ICBs for localisation and approval through standard ICB processes. The most recent version is available on the RDTC website at <https://rdtc.nhs.uk/prescribing-support-document/shared-care-protocol-leflunomide-in-adults/>.

Information requiring local completion is highlighted.

This document is intended for use by NHS healthcare professionals and cannot be used for commercial or marketing purposes.

**Shared Care Protocol**

## Leflunomide for patients within adult services

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| Background | Leflunomide is a conventional disease-modifying anti-rheumatic agent (DMARD). It exhibits anti-inflammatory and antiproliferative effects through the inhibition of pyrimidine synthesis via dihydroorotate dehydrogenase.  It may be used as monotherapy or in combination with other DMARDs including methotrexate and sulfasalazine.  The therapeutic effect usually begins after 4-6 weeks and benefit may accrue for up to 6 months.  Leflunomide has a very long half-life of approximately 2 weeks, and in circumstances where rapid elimination is required a washout procedure may be given if advised by the specialist. This may be due to severe adverse effects, pregnancy, severe infection or if an alternative DMARD is indicated. Washout is typically given as colestyramine 8g taken three times daily or activated charcoal 50g four times daily, for up to 11 days. See [section 7](#seven_pharmaceutical) for further information. |
| Licensed and agreed off-label indications | Leflunomide is licensed for use in:   * Rheumatoid arthritis * Psoriatic arthritis     It may also be used off label for other inflammatory conditions including:   * Rheumatology conditions (e.g. systemic lupus erythematosus, axial spondyloarthopathy) * Interstitial lung disease * Vasculitis   These additional indications are off-label. The initiating specialist must specify the indication for each patient when initiating shared care and clearly state when use is off-label.  This shared care protocol applies to adults aged 18 and over. |
| Locally agreed indications | *To be completed locally* |
| Initiation and ongoing dose regime | Transfer of monitoring and prescribing to primary care is normally after at least 12 weeks, and when the patient’s dose has been optimised and with satisfactory investigation results for at least 12 weeks.  The duration of treatment & frequency of review will be determined by the specialist, based on clinical response and tolerability.  All dose or formulation adjustments will be the responsibility of the initiating specialist unless directions have been discussed and agreed with the primary care clinician.  Termination of treatment will be the responsibility of the specialist. Initial stabilisation: An initial dose of 10-20mg once daily is normally given.  Short loading regimens may be used, however these may increase the risk of adverse effects and are considered optional.  **The loading period must be prescribed by the initiating specialist.** Maintenance dose (following initial stabilisation): 10-20mg once daily. Due to the long half-life, doses of 10mg and 20mg may be given on alternate days.  **The initial maintenance dose must be prescribed by the initiating specialist.** Conditions requiring dose adjustment: None |
| Baseline investigations, initial monitoring, and ongoing monitoring to be undertaken by specialist | Monitoring at baseline and during initiation is the responsibility of the specialist; only once the patient is optimised on the chosen medication with no anticipated further changes expected in the immediate future will prescribing and monitoring be transferred to primary care. Baseline investigations:  * Height and weight * Blood pressure * Full blood count (FBC) * Urea and electrolytes (U&Es) & creatinine clearance (CrCl) * Alanine aminotransferase (ALT) and/or aspartate aminotransferase (AST), and albumin * Screening for viral infections as per local policy, e.g. HIV, hepatitis B and C, varicella zoster, Epstein Barr virus, cytomegalovirus * Screening for lung disease, including interstitial lung disease, should be undertaken at clinician discretion on a case-by-case basis. * Provide or request appropriate vaccination prior to treatment initiation, according to local arrangements (e.g. pneumococcal, shingles, influenza, COVID-19) * Pregnancy should be excluded before starting treatment.   Initial monitoring and at dose change:  To be repeated every 2 weeks until the dose has been stable for 6 weeks, then monthly for 3 months.   * Blood pressure and weight * FBC * U&Es, including creatinine and CrCl * AST and/or ALT, and albumin   Following a dose change repeat every 2 weeks until the dose has been stable for 6 weeks, then revert to previous schedule.  More frequent monitoring is appropriate in patients at higher risk of toxicity; e.g. concurrent use of more than one DMARD. This is particularly important for patients co-prescribed methotrexate and leflunomide, since this combination is highly effective but potentially synergistically toxic to liver and bone marrow. Patients taking concomitant methotrexate and leflunomide require longer term monthly monitoring. Patients who have been stable for 12 months can be considered for reduced frequency monitoring on an individual patient basis.  The specialist will retain the responsibility for monitoring the patient’s ongoing response to treatment, and advise if a dose change or treatment cessation is appropriate. This should usually be undertaken annually.  When a patient is reviewed, advise primary care whether treatment should be continued, confirm the ongoing dose, and whether the ongoing monitoring outlined in [section 6](#six_monitoring) remains appropriate. |

## Ongoing monitoring requirements to be undertaken by primary care

If monitoring results are forwarded to the specialist team, please include clear clinical information on the reason for sending, to inform action to be taken by secondary care.

| **Monitoring** | **Frequency** |
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| * FBC * U&Es including creatinine and CrCl * ALT and/or AST and albumin * Blood pressure & weight   Rheumatology patients: CRP &/or ESR | Monthly for the first 3 months of treatment followed by:  At least every 12 weeks, and more frequently in patients at higher risk of toxicity, as advised by the specialist team.  **The exact frequency of monitoring to be communicated by the specialist in all cases**. |
| * Patients aged 60-79 years old are eligible for the shingles vaccine (herpes zoster). Patients aged 50 years or older and taking immunosuppressive therapy may also be eligible. Specialist input may be required. Refer to [Green Book Chapter 6 (Contraindications and special considerations)](https://www.gov.uk/government/publications/contraindications-and-special-considerations-the-green-book-chapter-6) and [Green Book Chapter 28a (Shingles)](https://www.gov.uk/government/publications/shingles-herpes-zoster-the-green-book-chapter-28a) for further details. * **Annual** influenza ([The Green Book, Chapter 19](https://www.gov.uk/government/publications/influenza-the-green-book-chapter-19)) vaccinations are recommended. * COVID-19 vaccination is safe and recommended.   Repeat pneumococcal vaccine may be indicated. See [Green Book Chapter 25](https://www.gov.uk/government/publications/pneumococcal-the-green-book-chapter-25) for advice. | * Shingles vaccination: one course (two doses). * Influenza vaccination: annual. It is advisable to add the patient to the influenza vaccine list.   Other vaccinations as per national schedule. |

## Pharmaceutical aspects

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| Route of administration: | Oral |
| Formulation: | 10mg and 20mg tablets. |
| Administration details: | Tablets should be swallowed whole with sufficient water. Administration with food does not affect absorption. |
| Other important information: | The active metabolite of leflunomide has a half-life of approximately 2 weeks and undergoes extensive enterohepatic recycling and may therefore persist for long periods of time even after administration has stopped. It is not sufficient to only stop the drug because adverse effects may still occur or worsen  If serious adverse effects occur, the patient becomes pregnant, before starting treatment with an alternative DMARD, or for other reasons which require the rapid elimination of leflunomide, a washout procedure may be necessary. This is given as colestyramine 8g taken three times daily **or** activated charcoal 50g four times daily, usually for 11 days. This should be discussed with a specialist before initiating procedure.  The washout procedure interrupts the enterohepatic recycling mechanism and reduces the half-life of leflunomide to around 1 - 2 days. If the patient cannot manage the full 11 day course, there is evidence that even a few days treatment is likely to be beneficial and that 48 hours of treatment may reduce the active metabolite of leflunomide by 49 - 65% if using colestyramine and by 48% for charcoal. |

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| Cautions and contraindications | This information does not replace the Summary of Product Characteristics (SPC), and should be read in conjunction with it. Please see [BNF](https://bnf.nice.org.uk/drugs/leflunomide/) & [SPC](https://www.medicines.org.uk/emc/search?q=leflunomide) for comprehensive information.  **Contraindications:**   * Hypersensitivity to leflunomide or any excipients * Patients with rare hereditary problems of galactose intolerance, the Lapp lactase deficiency or glucose-galactose malabsorption * Serious infection * Liver impairment * Moderate to severe renal impairment * Severe hypoproteinaemia * Severe immunodeficiency * Pregnancy and breastfeeding, or patients who are not using effective contraception during treatment. People of child-bearing potential should use effective contraception for up to 2 years after stopping treatment. Avoid where possible in people of child-bearing potential. See [section 12](#twelve_pregnancy).   **Cautions**:   * Anaemia: avoid if significant and due to causes other than rheumatoid or psoriatic arthritis. * Localised or systemic infection which may be more severe * History of HIV, tuberculosis, hepatitis B or C * Impaired bone-marrow function, leucopenia, or thrombocytopenia: avoid if significant and due to causes other than rheumatoid or psoriatic arthritis. * Use of concurrent haematotoxic or hepatotoxic DMARDs e.g. methotrexate * There is a theoretical risk of male-mediated foetal toxicity so effective contraception should be used throughout treatment. Those patients wishing to father a child should discuss with the specialist who may want to follow the washout procedure before advising he attempt conception (see [section 6](#seven_pharmaceutical)). |
| Significant drug interactions | The following list is not exhaustive. Please see [BNF](https://bnf.nice.org.uk/drugs/leflunomide/) & [SPC](https://www.medicines.org.uk/emc/search?q=leflunomide) for comprehensive information and recommended management.   * **Anticoagulants**: The anticoagulant effect of vitamin K anticoagulants may be increased by leflunomide. Close INR monitoring and follow-up is recommended. * **Live vaccines** (e.g. oral polio, oral typhoid, MMR, BCG) should generally be avoided. Clinician discretion is advised, see [section 6](#six_monitoring). * **JAK kinase inhibitors**, e.g. baricitinib, filgotinib: due to the increased risk of immunosuppression. * **Colestyramine and activated charcoal**: Co-administration leads to a rapid and significant decrease in plasma levels of leflunomide metabolites by interrupting enterohepatic recirculation * **Repaglinide, paclitaxel, pioglitazone, cefaclor, benzylpenicillin, ciprofloxacin, indomethacin, ketoprofen, furosemide, cimetidine, zidovudine, venetoclax**: Leflunomide may increase the exposure to these products. * **Rosuvastatin** levels may be increased by leflunomide. A maximum rosuvastatin dose of 10mg is recommended. Caution is recommended with **other statins** and dose reduction may be required. |

## Adverse effects and management

As well as responding to absolute values in laboratory tests, a rapid change or a consistent trend in any value should prompt caution and extra vigilance**.** For information on incidence of ADRs see relevant SPCs.

**Any serious adverse reactions should be reported to the MHRA via the Yellow Card scheme. Visit** [www.mhra.gov.uk/yellowcard](http://www.mhra.gov.uk/yellowcard).

Advice based on shared care guidelines published by NHS England, and checked against current guidance.

| **Adverse effect** | **Management** |
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| Full blood count:  * White blood cells <3.5x109/L * Lymphocytes less than 0.5x109/L * Neutrophils <1.6x109/L * Platelets <140x109/L * Eosinophilia >0.5x109/L | Withhold and discuss with specialist team. |
| Mean cell volume >105 fL | Consider interruption in treatment.  Check serum folate, B12, alcohol history and TSH and treat any underlying abnormality. If results of these additional investigations are normal discuss with specialist team urgently. |
| Blood pressure | Treat hypertension in line with NICE guidance. If BP remains uncontrolled, withhold leflunomide and discuss with specialist team |
| Weight | If >10% weight loss with no cause identified, withhold leflunomide and discuss with specialist team. |
| Signs or symptoms of bone marrow suppression, e.g. unexplained bleeding or bruising with or without sore throat, mouth ulcers. | Check FBC immediately and discuss with the specialist team. See haematological monitoring above. |
| Acute infection | During serious infections temporarily withhold leflunomide until the patient has recovered. Consider if additional investigations (e.g. FBC) and washout procedure required – discuss with specialist team. [See section 7](#seven_pharmaceutical) |
| **Liver function tests**:  ALT or AST >100 units/L, or any sudden increases (e.g. double of baseline), OR  Unexplained fall in serum albumin <30g/L  Jaundice | Withhold and discuss with specialist team. Consider washout procedure. [See section 7](#seven_pharmaceutical)  Assess for other causes of hepatic dysfunction such as alcohol history and drug interactions, including OTC or complementary medication. |
| **Renal function**:  Creatinine increase of greater than 30% from baseline in the last 12 months or GFR reduces to less than 60mL/min | Withhold and discuss with specialist team. |
| **Gastrointestinal disorders**:  Nausea | Review for reversible causes. Discuss with specialist team if persistent or severe. Washout, under specialist advice, may be required if severe. [See section 7](#seven_pharmaceutical) |
| Diarrhoea | Diarrhoea is common and usually settles. If persistent or severe, withhold and discuss with specialist team. |
| Ulcerative stomatitis, haematemesis, black or bloody stools, or suspected pancreatitis. | Withhold and discuss with specialist team. Washout, under specialist advice, may be required if severe. [See section 7](#seven_pharmaceutical) |
| **Symptoms of interstitial lung disease** e.g. persistent cough, dyspnoea, fever | If leflunomide-induced lung disease is suspected, discuss with specialist team urgently. Consider washout procedure. See [section 7](#seven_pharmaceutical) Treat as advised by specialist and do not restart leflunomide. |
| **Generalised rash** | Discuss with specialist, washout may be required if severe. See [section 7](#seven_pharmaceutical) |
| **Pregnancy** | Stop leflunomide immediately and discuss with specialist team urgently. Washout should be considered. See [section 12](#twelve_pregnancy). |

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| Advice to patients and carers The specialist will counsel the patient with regard to the benefits and risks of treatment and will provide the patient with any relevant information and advice, including patient information leaflets on individual drugs. | The patient should be advised to report any of the following signs or symptoms to their primary care prescriber without delay:  * Symptoms of chickenpox, or contact with a person with chickenpox or shingles. * Persistent cough, shortness of breath, or any other problems with breathing. * Sore throat, high temperature, skin rash, swollen glands, or any other signs or symptoms of infection. * Signs or symptoms of liver problems, such as yellow skin or eyes (jaundice), itching all over, nausea or vomiting. * Unexplained bleeding or bruising, black stools, or blood in the vomit or stools. * Suspected or confirmed pregnancy. * Any tingling, numbness or weakness in extremities that may indicate peripheral neuropathy.  The patient should be advised:  * Moderate their alcohol intake to no more than 4 units per week while taking leflunomide; taking alcohol and leflunomide together increases the risk of liver injury. * Tell anyone who prescribes them a medicine that they are taking leflunomide. Always ask a pharmacist before purchasing any medicines over the counter, including herbal remedies, and ask if they are safe. * To use effective contraception, and to take a pregnancy test if they think they could be pregnant. Patients should inform the specialist or GP as soon as possible if they become pregnant. All patients, both male and female, should inform their specialist well in advance if they are planning a pregnancy so that changes can be made to their treatment regime.   Patient information:  Leflunomide in rheumatoid arthritis:   * [National Rheumatoid Arthritis Society](https://nras.org.uk/resource/leflunomide/) * [Versus Arthritis](https://www.versusarthritis.org/about-arthritis/treatments/drugs/leflunomide/)   General Information: [Patient.info](https://patient.info/medicine/leflunomide-tablets-for-arthritis-arava) |
| Pregnancy, paternal exposure and breastfeeding | Pregnancy: Leflunomide is contraindicated in pregnancy. Patients of child-bearing potential should use effective contraception during and for up to 2 years after treatment, unless a washout procedure is followed (see below). See [FSRH statement on contraception for women using known teratogenic drugs](https://www.fsrh.org/standards-and-guidance/documents/fsrh-ceu-statement-contraception-for-women-using-known/) for information on contraceptives considered highly effective.  The active metabolite of leflunomide is highly protein bound and because of extensive enterohepatic recycling its half-life is prolonged. The manufacturer currently recommends a two-year waiting period after discontinuation of the medicine before attempting to conceive. The manufacturer also advises that the plasma levels of the active metabolite of leflunomide (teriflunomide) should be below 0.02mg/L at the end of the two year period, confirmed by a second test after an interval of at least 14 days. If both tests show plasma levels of teriflunomide to be less than 0.02mg/L, then no teratogenic risk is expected. It is important to note that this test may only be available to patients who are taking the branded Arava® leflunomide tablets.  If a waiting period of 2 years using effective contraception is considered unpractical, a washout procedure may be advisable (see [section 7](#seven_pharmaceutical)). Following this, the recommendations regarding verification of teriflunomide levels remain. Two tests must be done no less than 14 days apart and conception is not advised until one and a half months after the first plasma concentration below 0.02mg/L. This test may only be available to patients who are taking the branded Arava® leflunomide tablets.  If a woman becomes pregnant while taking leflunomide or within two years after discontinuation, the manufacturer recommends an immediate 11-day washout procedure with colestyramine or activated charcoal (see [section 7](#seven_pharmaceutical)).   * Information for healthcare professionals: [UK Teratology Information Service (UKTIS)](https://uktis.org/monographs/use-of-leflunomide-in-pregnancy/) * Information for patients and carers: [Best Use of Medicines Pregnancy (BUMPs)](https://www.medicinesinpregnancy.org/Medicine--pregnancy/Leflunomide/)  Breastfeeding: Leflunomide and its metabolites pass into breast milk in animal studies. Manufacturer states that leflunomide is contraindicated for breastfeeding patients.  Information for healthcare professionals: [UK Drugs in Lactation Service](https://www.sps.nhs.uk/medicines/leflunomide/%20) Paternal exposure: Male patients should be aware of the possible male-mediated foetal toxicity. Effective contraception during treatment with leflunomide should also be guaranteed. Manufacturers advise that men wishing to father a child should consider stopping leflunomide and following a washout procedure. |
| Specialist contact information and arrangements for referral | *To be completed locally* |
| Additional information | Where patient care is transferred from one specialist service or GP practice to another, a new shared care agreement must be completed. Ensure that the specialist is informed in writing of any changes to the patient’s GP or their contact details. |
| References | 1. British National Formulary. Accessed via <https://bnf.nice.org.uk/> on 20/12/23 2. Arava 10mg tablets. Date of revision of the text March 2022. Accessed via [https://www.medicines.org.uk/emc/product/4056/smpc on 20/12/23](https://www.medicines.org.uk/emc/product/4056/smpc%20on%2020/12/23) 3. Arava 20mg tablets. Date of revision of the text March 2022. Accessed via: <https://www.medicines.org.uk/emc/product/4055/smpc> on 20/12/23 4. Leflunomide Mylan 20mg film-coated tablets. Date of revision of the text 10/2022. Accessed via [https://www.medicines.org.uk/emc/product/8567/smpc on 20/12/23](https://www.medicines.org.uk/emc/product/8567/smpc%20on%2020/12/23) 5. Leflunomide medac 15mg film-coated tablets. Date of revision of the text 28/03/22. Accessed via <https://www.medicines.org.uk/emc/product/5243/smpc> on 20/12/23 6. British Society of Rheumatology and British Health Professionals in Rheumatology. 2017. [Guidelines for the prescription and monitoring of non-biologic disease-modifying anti-rheumatic drugs](https://academic.oup.com/rheumatology/article/56/6/865/3053478). 7. British Society for Rheumatology 2023. Guideline on prescribing drugs in pregnancy and breastfeeding: immunomodulatory anti-rheumatic drugs and corticosteroids. Accessed via <https://academic.oup.com/rheumatology/article/62/4/e48/6783012> 8. UKTIS leflunomide in pregnancy monograph. Date of revision of the text October 2022. Accessed via <https://www.toxbase.org/poisons-index-a-z/l-products/leflunomide-in-pregnancy/> on 20/12/23 9. Specialist Pharmacy Service, safety in breastfeeding. Reviewed 15/07/21. Accessed via <https://www.sps.nhs.uk/medicines/leflunomide/> on 20/12/23 10. Renal Drug database leflunomide monograph. Date of revision of the text 22.02.2018. Accessed via [https://renaldrugdatabase.com/monographs/leflunomide on 20/12/23](https://renaldrugdatabase.com/monographs/leflunomide%20on%2020/12/23) 11. Rozman, B. Clinical Pharmacokinetics of leflunomide. Clin Pharmacokinet 2002; 41; 421-430. <https://pubmed.ncbi.nlm.nih.gov/12074690/> |
| To be read in conjunction with the following documents | * Shared Care for Medicines Guidance – A Standard Approach (RMOC). Available from <https://www.sps.nhs.uk/articles/rmoc-shared-care-guidance/> * NHSE guidance – Responsibility for prescribing between primary & secondary/tertiary care. Available from <https://www.england.nhs.uk/publication/responsibility-for-prescribing-between-primary-and-secondary-tertiary-care/> * General Medical Council. Good practice in prescribing and managing medicines and devices. Shared care. Available from <https://www.gmc-uk.org/ethical-guidance/ethical-guidance-for-doctors/good-practice-in-prescribing-and-managing-medicines-and-devices/shared-care> * NICE NG197: Shared decision making. Last updated June 2021. <https://www.nice.org.uk/guidance/ng197/>. |