North of Tyne and Gateshead Area Prescribing Committee

Shared Care Guidance for Immunosuppressive Treatment following Renal Transplantation in Adults

Updated December 2016

This guidance has been prepared and approved for use in Newcastle, North Tyneside, Northumberland and Gateshead. It gives details of the responsibilities of GPs and specialist services in shared care arrangements and is intended to provide sufficient information to enable GPs to prescribe this treatment within the shared care arrangement.

Further copies are available from:

<table>
<thead>
<tr>
<th>NECS Medicines Optimisation Pharmacists</th>
<th>NECS Medicines Optimisation Team</th>
<th>T 01912172756</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medicines Management Unit, Freeman Hospital, Newcastle upon Tyne</td>
<td>Newcastle Upon Tyne Hospitals NHS Trust</td>
<td>T 0191 2231386</td>
</tr>
</tbody>
</table>

An electronic version of this document can also be viewed / downloaded from the North of Tyne Area Prescribing Committee's Website

http://www.northoftyneapc.nhs.uk

<table>
<thead>
<tr>
<th>Approved on behalf of the</th>
<th>Name</th>
<th>Signature</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>North of Tyne Medicines Guidelines and Use Group</td>
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<tr>
<td>North of Tyne Area Prescribing Committee</td>
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<td>10/1/17</td>
</tr>
<tr>
<td>Newcastle and Gateshead CCG, North Tyneside CCG, Northumberland CCG</td>
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</table>
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A. Introduction to renal transplantation

Transplantation is now the treatment of choice for many patients with End Stage Renal Failure (ESRF). Each year there are close to 3000 renal transplants in the UK, 120-140 of which are performed in Newcastle. There are, however, approximately 5000 patients on the UK transplant waiting list, most of whom can expect to wait up to three years until a suitable organ becomes available. Organs for transplantation are a valuable resource, and the number of potential recipients is increasing every year.

Both patient and graft (transplanted organ) survival has improved substantially over the last 50 years, and continues to do so. Around 95% of cadaveric renal transplants are functioning 1 year following transplantation, and 81% at 5 years. Corresponding figures for live-donor transplants are 99% and 93%. Patient survival 1-year after transplantation is 96% for deceased donor recipients and 100% for live donor recipients. Patients with a transplant live longer than those on dialysis, have a better quality of life, and cost the NHS less.

At the Institute of Transplantation at Freeman Hospital, kidney and pancreas transplants are undertaken on patients from the Renal Units in Newcastle, Carlisle, Sunderland and Middlesbrough. Following transplantation, patients remain as in-patients until renal function is stable, and they are established on an immunosuppressive regimen. They are then discharged to their referring Renal Unit for out-patient follow up.

Post-transplant follow up

Following successful transplantation, patients are followed in a specialist transplant clinic for the lifetime of their graft. There are several important objectives of follow up:

- Monitoring and preservation of renal function
- Monitoring and modification of immunosuppression
- Prevention and management of complications of immunosuppression:
  - Malignancy
  - Infection
  - Osteoporosis
- Prevention of cardiovascular disease
- Shared care with other specialists, for example during pregnancy

Frequency of follow up

Most patients remain in hospital for about two weeks following transplantation. For up to 1 month after discharge they are seen 2 or 3 times per week. For those followed in Newcastle these first visits are to the Renal Clinical Investigation Unit (RCIU) at the Freeman Hospital. Patients are then transferred to the renal transplant out patient clinic. The frequency of subsequent visits depends on the stability of graft function, and the presence of any concurrent illnesses.

- 4 weeks following discharge – 2 or 3 times a week
- 4 - 12 weeks – once a week
- 12 - 24 weeks – once every 2 weeks
- 6 months – 1 year – once a month
- Second year – once every 2 months
- Subsequent visits every 3 or 4 months
What happens at a follow up appointment?

Most episodes of acute rejection occur in the first few months following transplantation, so the focus of these early follow up appointments is on monitoring renal function and ensuring adequate immunosuppression. As the risk of acute rejection decreases, the intensity of immunosuppression is reduced to minimise adverse effects, in particular the nephrotoxicity of the calcineurin inhibitors ciclosporin and tacrolimus.

In the long term, cardiovascular disease is the most important cause of morbidity and mortality in transplant recipients. Close attention is paid to modifiable risk factors, and all patients receive primary prevention in the form of aspirin and statin treatment.

At a follow up visit patients can expect:

- Measurement of weight and blood pressure.
- To see a nephrologist or transplant surgeon, almost always an SpR or Consultant.
- Review of all medications.
- Measurement of serum creatinine, electrolytes, LFT, FBC, random glucose and cholesterol, and trough levels of Ciclosporin, Tacrolimus or Sirolimus.

Following the clinic visit:

- Blood results will be reviewed by a doctor.
- Any abnormal results requiring action, or treatment changes, will be communicated to the patient by telephone, letter, or at a new appointment.
- A letter will be sent to the patient’s GP documenting any changes or recommendations.

Shared care of transplant recipients

Since all patients are followed up in the transplant clinic for the lifetime of their graft, the transplant unit undertakes to initiate and monitor immunosuppressive treatment, and also to initiate changes when necessary. At the request of NHS England, prescribing of post-transplant immunosuppressants will normally be done in the transplant clinic. Shared care will only be requested in extenuating circumstances, e.g. a patient requires a weekly medipack to support concordance.

The transplant unit will initiate prophylaxis against opportunistic infection, and recommend treatment for the prevention of cardiovascular disease and osteoporosis.

Our current protocols are listed below, and specific responsibilities enumerated in the guideline for each immunosuppressive drug.

Transplant recipients will continue to receive primary care from their own GPs. Please note that:

- The transplant team can be contacted at any time for advice (see ‘Contacts’ page 21).
- There are many important drug interactions with immunosuppressive medications, listed in the guideline for each drug.
- All female transplant recipients of childbearing age should receive adequate contraception and contraceptive advice (see ‘Pregnancy’ page 8).
- **Abrupt withdrawal or changes to immunosuppressive treatment may lead to acute rejection and even graft loss.**
B. Immunosuppressive Protocol

Immunosuppressive treatment following renal transplantation has been reviewed by NICE (TA85 - Immunosuppressive therapy for renal transplantation in adults)

The NICE appraisal recommends:

1. All patients receive induction therapy with anti-interleukin 2 receptor antibodies (either basiliximab or daclizumab).
2. Initial immunosuppressive therapy with a calcineurin inhibitor (CNI, either ciclosporin or tacrolimus), azathioprine and prednisolone.
3. Use of mycophenolate mofetil (MMF) in place of azathioprine to allow withdrawal or minimisation of CNI drugs.
4. Use of sirolimus only to allow complete elimination of CNI drugs.

The Newcastle protocol

Our current immunosuppressive protocol is shown in Table 1, and is based on the NICE appraisal. We have chosen to use tacrolimus in all patients. When compared with ciclosporin, tacrolimus is associated with 50% fewer episodes of acute rejection, less pronounced adverse effects on cardiovascular risk, and fewer cosmetic side effects. Our preferred brand of tacrolimus is Adoport, although some patients will be prescribed Prograf and Advagraf. Tacrolimus should be prescribed by brand name and referred to by brand name in all correspondence. In addition to tacrolimus, most patients will receive MMF and prednisolone. Azathioprine is used as an alternative to MMF in patients of lower immunological risk.

We have also chosen to use MMF in place of azathioprine in situations where there is a high risk of acute rejection. Immunosuppression in such ‘high risk’ patients was not specifically addressed by NICE. MMF is associated with a 50% reduction in acute rejection when compared with azathioprine, which we believe justifies the use of MMF in these patients.

Many patients transplanted in the past will continue to receive ciclosporin as part of their immunosuppressive treatment as an alternative to tacrolimus.

Drug dosing and monitoring.

Initial doses and recommended monitoring for each drug are shown in the Shared Care Guideline. The required dose of tacrolimus, ciclosporin and sirolimus varies substantially from patient to patient, and is determined by measurement of whole blood drug levels performed immediately before a dose (that is, a ‘trough’ level). Most episodes of acute rejection occur in the first few months following transplantation, thus target drug levels are highest in months 1 to 6. As the risk of acute rejection declines, target drug levels are reduced in order to minimise side effects (particularly nephrotoxicity) whilst maintaining adequate immunosuppression.

There are many important drug interactions with tacrolimus, ciclosporin and sirolimus. The most important are listed in the Shared Care Guideline for each drug, but great care is needed when prescribing for these patients.
The target levels for tacrolimus, ciclosporin and sirolimus are shown below. Doses are adjusted in the transplant clinic.

<table>
<thead>
<tr>
<th></th>
<th>Tacrolimus</th>
<th>Ciclosporin</th>
<th>Sirolimus</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-6 months</td>
<td>4 - 8 ng/ml</td>
<td>200 - 250 ng/ml</td>
<td>5 - 10 ng/ml</td>
</tr>
<tr>
<td>6-12 months</td>
<td>4 - 8 ng/ml</td>
<td>150 - 200 ng/ml</td>
<td>5 - 10 ng/ml</td>
</tr>
<tr>
<td>After 12 months</td>
<td>3 - 6 ng/ml</td>
<td>100 - 150 ng/ml</td>
<td>4 - 8 ng/ml</td>
</tr>
</tbody>
</table>

**Corticosteroids**

Prednisolone has been a component of immunosuppressive treatment following renal transplantation since the 1950s. Modern protocols use low doses, typically starting at 20mg and then reducing to 5mg over 3 to 4 months. Complete withdrawal of prednisolone carries a 10-20% risk of acute rejection, but there is accumulating evidence that corticosteroids may be safely omitted from regimens that include both tacrolimus and MMF. This option is included in our protocol. Most patients will receive low-dose prednisolone as follows:

- 20mg - weeks 0-4
- 17.5mg - weeks 5-6
- 15mg - weeks 7-8
- 12.5mg - weeks 9-10
- 10mg - weeks 11-12
- 7.5mg - weeks 13-14
- 5mg - thereafter
C. Prophylactic Treatment

1. Anti-microbial prophylaxis

Renal transplant recipients are at increased risk of infection. Once the patient is discharged from hospital and the surgical wounds have healed, most of the excess risk is related to opportunistic infection with fungi (Candida sp, Pneumocystis jirovecii), viruses (CMV, VZV and other herpes viruses) and occasionally TB. Immunosuppressive treatment does not seem to dramatically increase the risk of common bacterial infections, although when transplant patients develop such infections they are more likely to be severe. An important exception is the risk of urinary tract infection, particularly in those patients predisposed to UTI as a result of anatomical abnormalities of the urinary tract.

Pneumocystis jirovecii. All patients receive trimethoprim 80mg/sulfamethoxazole 400mg (480mg co-trimoxazole) for 6 months following transplantation. Patients allergic to either component may receive either dapsone (with or without trimethoprim), azithromycin or atovaquone (doses advised on individual basis).

Cytomegalovirus. Patients without evidence of exposure or immunity to CMV, determined by lack of circulating anti-CMV IgG antibodies, are at risk of invasive CMV disease if they receive an organ from a CMV positive donor. These patients receive CMV prophylaxis with valganciclovir for 100 days following transplantation. Valganciclovir is also given to patients who receive augmented immunosuppressive treatment with anti-lymphocyte antibodies. The dose of valganciclovir is determined by the patients’ renal function (see Table 2).

Urinary Tract Infection. Cotrimoxazole provides some prophylaxis against UTI for the first 6 months following transplantation. Prolonged prophylaxis may be required in some patients, usually with cefalexin 250mg at night.

Immunisation. All transplant recipients should receive the annual Influenza vaccine. Pneumococcal vaccine (Pneumovax 23) should be given once every 5 years.

Patients on immunosuppressive treatment should NOT receive any live vaccines. Examples of live vaccines include oral polio vaccine (OPV), BCG, Yellow Fever and the MMR vaccine.

2. Prophylaxis against cardiovascular disease

Cardiovascular disease is the commonest cause of death amongst renal transplant recipients. The risk of cardiovascular death in dialysis patients is increased by 20 fold when compared to the general population, and transplantation reduces this risk only by about one half. Such a high incidence of cardiovascular death justifies an aggressive prevention strategy, analogous to that used in secondary prevention in the general population.

Hypertension. Target blood pressure is better than 130/80, or 125/75 in those with proteinuria. ACE inhibitors (ACEI) and/or Angiotensin II receptor antagonists (AIIRA) are the treatment of choice, especially if proteinuria is present. As in the general population, serum creatinine should be measured 2 weeks after the introduction or a change in the dose of either ACEI or AIIRA. An increase in the serum creatinine of 10% above baseline is acceptable. A more substantial rise in serum creatinine should be discussed with a Nephrologist.

Aspirin. All patients should receive Aspirin 75mg.

Cholesterol. All patients should receive lipid-lowering therapy with a statin medication, aiming for a total cholesterol of less than 4mmol/L. It is not clear whether any particular statin is to be preferred. Pravastatin and fluvastatin are hydrophilic, and do not interact with calcineurin inhibitors. Fluvastatin was used in a large multicentre study of renal transplant recipients (the ALERT study), and proved to be safe, although efficacy in reducing cardiovascular endpoints did not reach statistical significance. Many patients treated with fluvastatin do not reach target
cholesterol levels. We have chosen to use atorvastatin 10mg daily as first line treatment. If total cholesterol remains >4mmol/L, then the dose can be increased. Atorvastatin is lipophilic, and metabolised by the same enzymes as the calcineurin inhibitors ciclosporin and tacrolimus. Although there does not appear to be a significant interaction with tacrolimus (or sirolimus), concomitant prescription with ciclosporin does increase simvastatin and atorvastatin exposure. Consequently, ciclosporin-treated patients should avoid simvastatin and not exceed 10mg daily of atorvastatin.

3. Osteoporosis

There are no national or international guidelines recommending treatment to either prevent or treat osteoporosis in renal transplant recipients. National guidelines do exist for osteoporosis management in patients receiving long-term steroid therapy, which would include many transplant recipients. However, bone disease in patients with chronic kidney disease, and particularly patients who have been on dialysis, is complex. In particular, the use of calcium and vitamin D supplements may be inappropriate in some patients.

Our current practice is to identify high risk patients prior to renal transplantation, usually with a bone density scan. These patients would normally be offered prophylaxis with bisphosphonates. All other patients should have bone densitometry performed at one year following transplantation, and the result used to guide both treatment and further investigation.

4. Pregnancy

All female renal transplant recipients of child-bearing age should receive effective contraception.

Successful pregnancy is possible after a renal transplant. Women are advised not to consider pregnancy until at least one year after the transplant operation, and then only as a planned pregnancy. There are important issues surrounding blood pressure, proteinuria, renal function and medications that require careful assessment before contemplating pregnancy. Recommendations and treatment are different in each case, but women are managed jointly in the transplant clinic and the high-risk medical obstetric clinic.

Mycophenolate mofetil and mycophenolic acid (Myfortic) should be avoided in pregnancy.

The MHRA has recently published updated guidance advising that sexually active men taking mycophenolate mofetil or mycophenolic acid (Myfortic) should use a condom whilst taking the medication and for 90 days after stopping treatment. The advice is precautionary, but relates to two theoretical concerns. The first is that mycophenolate may affect sperm leading to a risk of birth defects in the child, and the second is that mycophenolate in semen might expose a female partner to similar risks to those seen in women who take the drug. Men taking mycophenolate who plan to father a child should speak to their nephrologist for advice.


Ciclosporin Shared Care Guideline

Introduction

Ciclosporin has been used as a component of immunosuppressive therapy to prevent rejection of solid organ transplants since 1984. It is usually given in combination with an antiproliferative agent (azathioprine or mycophenolate mofetil) and prednisolone. Ciclosporin, and the newer drug tacrolimus, are inhibitors of the enzyme calcineurin. Calcineurin inhibition suppresses T lymphocyte activation, which not only inhibits allograft rejection but also the T cell response to infection. Inhibition of T cell activity particularly predisposes to TB, viral infection (especially the herpes viruses such as VZV, EBV and CMV), and fungal infections (Pneumocystis jirovecii is the most important in the UK). Generic preparations of ciclosporin are now available and there may be significant variation in bioavailability between brands. Therefore, until further experience with the generic preparations is gained, only the Neoral® brand will be used in adult renal transplant recipients. It is essential that this is prescribed using the brand name.

Responsibilities of Nephrologist

- Assessment of the patient as fit enough to receive both an organ transplant and immunosuppressive treatment.
- Provision of information regarding immunosuppression, especially the risks and side effects, before the patient is placed on the national transplant waiting list.
- Prescription of an immunosuppressive regimen appropriate to the patient’s immunological history, and the condition of the organ to be transplanted.
- Indefinite follow-up of the patient and monitoring of immunosuppressive treatment.
- Provision of prophylaxis against opportunistic infection.
- To ensure that bone densitometry is performed at one year following transplantation where this is clinically appropriate.
- Provide recommendations for the management of cardiovascular risk, especially hypertension and hyperlipidaemia, and for the prevention of osteoporosis.
- Request participation in a shared care arrangement from the patient’s GP when the patient’s treatment has been stabilised and a shared care arrangement is clinically appropriate.
- Communication of management plan to GP

Responsibilities of GP

- To contact the Transplant Unit to confirm that he/she is happy to accept the shared care arrangement within 28 days of receiving the request.
- Communication with Transplant Unit should the patient develop intercurrent illness.
- Prescription of ciclosporin using the brand name.
- Management of hypertension (target BP better than 130/80) in co-operation with Transplant Unit.
- Management of hyperlipidaemia (total cholesterol < 4mmol/L) in co-operation with Transplant Unit.
- Up-to-date cervical and breast screening in women.
- Pneumococcal and annual influenza vaccination. Avoid all live vaccines.

Responsibilities of Patient

- Compliance with prescribed medications and dietary advice, and regular Transplant Clinic attendance
- No smoking
- Modest alcohol consumption
### Ciclosporin

<table>
<thead>
<tr>
<th>Indication</th>
<th>Immunosuppressive therapy to prevent rejection of solid organ allografts.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Formulations and strengths available</td>
<td>Neoral microemulsion soft gel capsules 10, 25, 50 and 100mg. Also available as a liquid at 100mg/ml.</td>
</tr>
<tr>
<td>Cost (for 28 days treatment – July 2013)</td>
<td>50mg bd £67.14 150mg bd £194.09 300mg bd £382.36 100mg bd £127.45 200mg bd £254.9</td>
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<tr>
<td>Dose</td>
<td>Initiation in hospital at 7mg/kg in two divided doses (10am &amp; 10pm). Maintenance dose determined by trough (pre-dose) measurement of whole blood ciclosporin level. Target level varies according to time since transplant.</td>
</tr>
<tr>
<td>Usual Dose Range</td>
<td>50mg bd up to 300mg bd</td>
</tr>
<tr>
<td>Likely duration of treatment</td>
<td>Indefinite, as long as treatment is considered appropriate by specialist.</td>
</tr>
<tr>
<td>Contraindications</td>
<td>Known hypersensitivity to Ciclosporin</td>
</tr>
<tr>
<td>Warnings</td>
<td>Breast feeding is contraindicated. May be used during planned pregnancy under specialist advice. <strong>Avoid all live vaccines</strong> (e.g. yellow fever, BCG, rubella, oral typhoid (rarely prescribed), MMR and live (oral) polio - inactivated polio vaccine can be used).</td>
</tr>
</tbody>
</table>
| Side Effects (Full list in BNF) | Nephrotoxicity  
Metabolic: hypertension, hyperlipidaemia and hperuricaemia  
Cosmetic: hirsuitism, gingival hypertrophy  
Neurological: tremor, dysaesthesia, rarely peripheral neuropathy  
Increased susceptibility to infection  
Increased risk of malignancy |
| Drug Interactions (Full list in BNF) | Ciclosporin metabolism is inhibited (and toxicity enhanced) by:  
Macrolide antibiotics (erthromycin, clarithromycin & azithromycin)  
Azole antifungal drugs (fluconazole, itraconazole, clotrimazole)  
Calcium antagonists (diltiazem, verapamil & lercanidipine – less so other dihydropyridine drugs)  
Grapefruit juice  
Ciclosporin metabolism is induced (and efficacy reduced) by:  
Anticonvulsants (carbamazepine, phenytoin & phenobarbitone)  
Some antibiotics (rifampicin & rifabutin)  
St Johns Wort  
Nephrotoxicity enhanced by all NSAIDs & sirolimus |
| Monitoring | FBC, U&E, LFT, glucose, lipids, ciclosporin trough levels and BP in Transplant Clinic (see page 4). |
**Tacrolimus Shared Care Guideline**

**Introduction**

Tacrolimus, like ciclosporin, is a calcineurin inhibitor. It is probably better at preventing acute rejection than ciclosporin, although there is no evidence that tacrolimus improves long-term graft survival. Both drugs are nephrotoxic. However, tacrolimus lacks the cosmetic side effects of ciclosporin, and may cause less hypertension and hyperlipidaemia. In contrast, post-transplant diabetes is more common with tacrolimus. Like ciclosporin, it is usually prescribed with an anti-proliferative agent (azathioprine or MMF) and prednisolone. NICE guidelines allow for the use of either tacrolimus or ciclosporin following renal transplantation. Generic preparations of tacrolimus are now available and there may be variation in bioavailability between the brands. **Four preparations of tacrolimus will be in use.** Adoport® is the preferred brand of tacrolimus, and is used in all de-novo kidney transplants. A few patients may remain on Prograf®, Advagraf® and Envarsus® are once daily modified-release preparations, which may be chosen for a small proportion of patients where a once-daily regime is preferable. It is essential that these are prescribed using the brand name to avoid confusion between the preparations.

**Responsibilities of Nephrologist**

- Assessment of the patient as fit enough to receive both an organ transplant and immunosuppressive treatment.
- Provision of information regarding immunosuppression, especially the risks and side effects, **before** the patient is placed on the national transplant waiting list.
- Prescription of an immunosuppressive regimen appropriate to the patient’s immunological history, and the condition of the organ to be transplanted.
- Indefinite follow-up of the patient and monitoring of immunosuppressive treatment.
- Provision of prophylaxis against opportunistic infection.
- To ensure that bone densitometry is performed at one year following transplantation where this is clinically appropriate.
- Provide recommendations for the management of cardiovascular risk, especially hypertension and hyperlipidaemia, and for the prevention of osteoporosis.
- Request participation in a shared care arrangement from the patient’s GP when the patient’s treatment has been stabilised and a shared care arrangement is clinically appropriate.
- Communication of management plan to GP

**Responsibilities of GP**

- To contact the Transplant Unit to confirm that he/she is happy to accept the shared care arrangement within 28 days of receiving the request.
- Communication with Transplant Unit should the patient develop intercurrent illness.
- Prescription of tacrolimus using the correct brand name.
- Management of hypertension (target BP better than 130/80) in co-operation with Transplant Unit.
- Management of hyperlipidaemia (total cholesterol < 4mmol/L) in co-operation with Transplant Unit.
- Up-to-date cervical and breast screening in women.
- Pneumococcal and annual influenza vaccination. **Avoid all live vaccines.**

**Responsibilities of Patient**

- Compliance with prescribed medications and dietary advice, and regular Transplant Clinic attendance.
- No smoking.
- Modest alcohol consumption.
<table>
<thead>
<tr>
<th>Tacrolimus</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Indication</strong></td>
<td>Immunosuppressive therapy to prevent rejection of solid organ allografts.</td>
</tr>
<tr>
<td><strong>Formulation and strengths available</strong></td>
<td>Prograf® Capsules 0.5mg, 1mg, 5mg. Adoport® capsules 0.5mg, 1mg, 5mg. Advagraf® prolonged release capsules, 0.5mg, 1mg, 3mg, 5mg (only for use where specifically approved). Envarsus® prolonged release tablets 0.75mg, 1mg, 4mg (only for use where specifically approved).</td>
</tr>
<tr>
<td><strong>Cost (for 28 days treatment) - December 2016</strong></td>
<td></td>
</tr>
<tr>
<td>Prograf®</td>
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</tr>
<tr>
<td>0.5mg bd</td>
<td>£69.30</td>
</tr>
<tr>
<td>1mg bd</td>
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<td>5mg bd</td>
<td>£332.16</td>
</tr>
<tr>
<td>10mg bd</td>
<td>£664.34</td>
</tr>
<tr>
<td>Adoport®</td>
<td></td>
</tr>
<tr>
<td>0.5mg bd</td>
<td>£47.26</td>
</tr>
<tr>
<td>1mg bd</td>
<td>£62.37</td>
</tr>
<tr>
<td>5mg bd</td>
<td>£230.04</td>
</tr>
<tr>
<td>10mg bd</td>
<td>£460.09</td>
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<tr>
<td>Advagraf®</td>
<td></td>
</tr>
<tr>
<td>0.5mg od</td>
<td>£20.04</td>
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<td>1mg od</td>
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<td>10mg od</td>
<td>£298.95</td>
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<td>0.75mg od</td>
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<td>1mg od</td>
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<td>4mg od</td>
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</tr>
<tr>
<td>8mg od</td>
<td>£441.28</td>
</tr>
<tr>
<td><strong>Dose</strong></td>
<td>Initiation in hospital at 0.1mg/kg in two divided doses (10am &amp; 10pm). Maintenance dose determined by trough (pre-dose) measurement of whole blood tacrolimus level. Target level varies according to time since transplant.</td>
</tr>
<tr>
<td><strong>Usual Dose Range</strong></td>
<td>0.5mg bd up to 10mg bd</td>
</tr>
<tr>
<td><strong>Likely duration of treatment</strong></td>
<td>Indefinite, as long as treatment is considered appropriate by specialist.</td>
</tr>
<tr>
<td><strong>Contraindications</strong></td>
<td>Known hypersensitivity to Tacrolimus</td>
</tr>
<tr>
<td><strong>Warnings</strong></td>
<td>Breast feeding is contraindicated. May be used during planned pregnancy under specialist advice. <strong>Avoid all live vaccines</strong> (e.g. yellow fever, BCG, rubella, oral typhoid (rarely prescribed), MMR and live (oral) polio - inactivated polio vaccine may be used).</td>
</tr>
</tbody>
</table>
| **Side Effects** (Full list in BNF) | Nephrotoxicity  
Metabolic: hypertension, hyperlipidaemia, hyperuricaemia & diabetes  
Cosmetic: alopecia  
Neurological: tremor, dysesthesia, rarely peripheral neuropathy  
Increased susceptibility to infection  
Increased risk of malignancy  
Rarely hypertrophic cardiomyopathy (only reported in children) |
| Drug Interactions                  | Tacrolimus metabolism is inhibited (and toxicity enhanced) by:  
|                                 | Macrolide antibiotics (erthromycin, clarithromycin & azithromycin)  
|                                 | Azole antifungal drugs (fluconazole, itraconazole, clotrimazole)  
|                                 | Calcium antagonists (diltiazem, verapamil & lercanidipine – less so other dihydropyridine drugs)  
|                                 | Grapefruit juice  
|                                 | Tacrolimus metabolism is induced (and efficacy reduced) by:  
|                                 | Anticonvulsants (carbamazepine, phenytoin & phenobarbitone)  
|                                 | Some antibiotics (rifampicin & rifabutin)  
|                                 | St Johns Wort  
|                                 | Nephrotoxicity enhanced by all NSAIDs & sirolimus  
| Monitoring                      | FBC, U&E, LFT, glucose, lipids, tacrolimus trough levels and BP in Transplant Clinic (see page 4). |
Sirolimus Shared Care Guideline

Introduction

Sirolimus (Rapamune®) has a novel mode of action. It is potently anti-proliferative, and acts by blocking the cellular response to cytokines and growth factors that signal through cell surface receptors. Sirolimus is equally effective at blocking the proliferation of immune cells (such as T lymphocytes) and non-immune cells. The latter effects include inhibition of wound healing, and possibly inhibition of tumour growth. For this reason, sirolimus may be less likely to cause malignancy than other immunosuppressive drugs. Unlike calcineurin inhibitors, sirolimus is not nephrotoxic, although does seem to enhance ciclosporin nephrotoxicity when both drugs are administered simultaneously.

The product licence stipulates initial use of sirolimus in combination with ciclosporin, but that ciclosporin be withdrawn 3 months following renal transplantation to avoid nephrotoxicity. NICE guidelines recommend sirolimus only in patients intolerant of calcineurin inhibitors.

Responsibilities of Nephrologist

- Assessment of the patient as fit enough to receive both an organ transplant and immunosuppressive treatment.
- Provision of information regarding immunosuppression, especially the risks and side effects, before the patient is placed on the national transplant waiting list.
- Prescription of an immunosuppressive regimen appropriate to the patient’s immunological history, and the condition of the organ to be transplanted.
- Indefinite follow-up of the patient and monitoring of immunosuppressive treatment. Provision of prophylaxis against opportunistic infection.
- To ensure that bone densitometry is performed at one year following transplantation where this is clinically appropriate.
- Provide recommendations for the management of cardiovascular risk, especially hypertension and hyperlipidaemia, and for the prevention of osteoporosis.
- Request participation in a shared care arrangement from the patient’s GP when the patient’s treatment has been stabilised and a shared care arrangement is clinically appropriate.
- Communication of management plan to GP

Responsibilities of GP

- To contact the Transplant Unit to confirm that he/she is happy to accept the shared care arrangement within 28 days of receiving the request.
- Communication with Transplant Unit should the patient develop intercurrent illness.
- Prescription of immunosuppressive medications.
- Management of hypertension (target BP better than 130/80) in co-operation with Transplant Unit.
- Management of hyperlipidaemia (total cholesterol < 4mmol/L) in co-operation with Transplant Unit.
- Up-to-date cervical and breast screening in women.
- Pneumococcal and annual influenza vaccination. Avoid all live vaccines.

Responsibilities of Patient

- Compliance with prescribed medications and dietary advice, and regular Transplant Clinic attendance
- No smoking
- Modest alcohol consumption
**Sirolimus**

<table>
<thead>
<tr>
<th><strong>Indication</strong></th>
<th>Immunosuppressive therapy to prevent rejection of solid organ allografts.</th>
</tr>
</thead>
</table>
| **Formulations and strengths available** | Rapamune Tablets 0.5, 1 & 2mg  
Also available as a liquid at 1mg/ml. |
| **Cost (for 28 days treatment) – December 2016** | 0.5mg £64.4  
1mg daily £80.72  
2mg daily £161.44  
3mg daily £242.16  
4mg daily £322.88  
5mg daily £403.60 |
| **Dose** | Initiation in hospital as 6mg loading dose, then 2mg once daily.  
Maintenance dose determined by trough (pre-dose) measurement of whole blood sirolimus level. Target level varies according to time since transplant. |
| **Usual Dose Range** | 0.5 – 5mg once daily |
| **Likely duration of treatment** | Indefinite, as long as treatment is considered appropriate by specialist. |
| **Contraindications** | Known hypersensitivity to sirolimus.  
Pregnancy and breast feeding. |
| **Warnings** | Avoid all live vaccines (e.g. yellow fever, BCG, rubella, oral typhoid (rarely prescribed), MMR and live (oral) polio - inactivated polio vaccine may be used). |
| **Side Effects (Full list in BNF)** | Metabolic: hyperlipidaemia  
Haematologic: thrombocytopenia, anaemia and leucopenia  
Impaired wound healing  
Pneumonitis  
Increased susceptibility to infection  
Increased risk of malignancy |
| **Drug Interactions (Full list in BNF)** | Sirolimus metabolism is inhibited (and toxicity enhanced) by:  
Macrolide antibiotics (erthromycin, clarithromycin & azithromycin)  
Azole antifungal drugs (fluconazole, itraconazole, clotrimazole)  
Calcium antagonists (diltiazem, verapamil & lercanidipine – less so other dihydropyridine drugs)  
Grapefruit juice  

Sirolimus metabolism is induced (and efficacy reduced) by:  
Anticonvulsants (carbamazepine, phenytoin and phenobarbitone)  
Some antibiotics (rifampicin & rifabutin)  
St Johns Wort |
| **Monitoring** | FBC, U&E, LFT, glucose, lipids, sirolimus trough levels and BP in Transplant Clinic (see page 4). |
**Mycophenolate Mofetil (MMF) Shared Care Guideline**

**Introduction**

MMF blocks both T and B lymphocyte proliferation by inhibiting purine nucleotide synthesis. Most cell types can synthesise purines using either a *de novo* or a scavenger pathway. In contrast, rapidly proliferating lymphocytes rely on the scavenger pathway. MMF inhibits the rate-limiting enzyme of this pathway (inosine monophosphate dehydrogenase - IMPDH), and for this reason is a relatively specific immunosuppressive drug. Other bone marrow-derived cells are also susceptible to MMF, and anaemia, neutropaenia and thrombocytopenia are common side effects.

MMF is a pro-drug, and rapidly metabolised to the active compound mycophenolic acid (MPA) in the liver. MPA is excreted in bile, and undergoes entero-hepatic recirculation. As a result, the concentration of MPA in the intestinal lumen is high. This accounts for diarrhoea, which is the other important side effect of MMF. Mycophenolic acid (Myfortic®) causes less GI side-effects and can be used as an alternative to MMF when adverse effects such as diarrhoea are problematic.

**Responsibilities of Nephrologist**

- Assessment of the patient as fit enough to receive both an organ transplant and immunosuppressive treatment.
- Provision of information regarding immunosuppression, especially the risks and side effects, **before** the patient is placed on the national transplant waiting list.
- Prescription of an immunosuppressive regimen appropriate to the patient’s immunological history, and the condition of the organ to be transplanted.
- Indefinite follow-up of the patient and monitoring of immunosuppressive treatment.
- Provision of prophylaxis against opportunistic infection.
- To ensure that bone densitometry is performed at one year following transplantation where this is clinically appropriate.
- Provide recommendations for the management of cardiovascular risk, especially hypertension and hyperlipidaemia, and for the prevention of osteoporosis.
- Request participation in a shared care arrangement from the patient’s GP when the patient’s treatment has been stabilised and a shared care arrangement is clinically appropriate.
- Communication of management plan to GP

**Responsibilities of GP**

- To contact the Transplant Unit to confirm that he/she is happy to accept the shared care arrangement within 28 days of receiving the request.
- Communication with Transplant Unit should the patient develop intercurrent illness.
- Prescription of immunosuppressive medications.
- Management of hypertension (target BP better than 130/80) in co-operation with Transplant Unit.
- Management of hyperlipidaemia (total cholesterol < 4mmol/L) in co-operation with Transplant Unit.
- Up-to-date cervical and breast screening in women.
- Pneumococcal and annual influenza vaccination. **Avoid all live vaccines.**

**Responsibilities of Patient**

- Compliance with prescribed medications and dietary advice, and regular Transplant Clinic attendance
- No smoking
- Modest alcohol consumption
Information regarding Mycophenolate Mofetil and Mycophenolic acid (Myfortic®)

<table>
<thead>
<tr>
<th>Indication</th>
<th>Immunosuppressive therapy to prevent rejection of solid organ allografts.</th>
</tr>
</thead>
</table>
| Formulation and strengths available | **Mycophenolate Mofetil** 250mg capsules & 500mg tablets. Oral suspension 1000mg / 5ml  
Also available as **mycophenolic acid (Myfortic*)**.  
720mg Myfortic is equivalent to 1000mg Cellcept® |
| Cost (for 28 days treatment) – December 2016 | **Mycophenolate Mofetil**  
250mg bd £46.06  
500mg bd £7.43  
1g bd £14.87 1.5g bd £22.310  
1g per 5ml powder for oral suspension (175ml) £184.25  
**Myfortic®**  
180mg bd £45.13  
540mg bd £135.39  
360mg bd £90.26  
720mg bd £180.52 |
| Dose | Initiation in hospital at 2000mg daily in divided doses, either 1000mg bd or 500mg qds. An initial dose of 3000mg may be used in black patients. Dose may be reduced depending on side effects and is usually reduced to 500 mg on discharge. Patients taking tacrolimus or sirolimus may need lower MMF dose than those on ciclosporin |
| Usual Dose Range | 500 to 3000mg daily in divided doses |
| Likely duration of treatment | Indefinite, as long as treatment is considered appropriate by specialist. |
| Contraindications | Known hypersensitivity to Mycophenolic acid.  
Pregnancy and breast feeding. |
| Warnings | Active gastro-intestinal disease.  
Side effects may be more common in children and the elderly.  
**Avoid all live vaccines** (e.g. yellow fever, BCG, rubella, oral typhoid (rarely prescribed), MMR and live (oral) polio - inactivated polio vaccine may be used). |
| Side Effects (Full list in BNF) | Myelosuppression  
Gastro-intestinal toxicity, particularly diarrhoea  
Increased susceptibility to infection  
Increased risk of malignancy |
| Drug Interactions | Antacids and colestyramine reduce MMF absorption  
Aciclovir & valganciclovir may increase risk of myelosuppression; plasma levels of aciclovir and valganciclovir increased by MMF |
| Monitoring | FBC, U&E, LFT, glucose, lipids and BP in Transplant Clinic (see page 4).  
Mycophenolic acid trough levels are not routinely measured. |
Azathioprine Shared Care Guideline

Introduction

Azathioprine has been used as a component of immunosuppressive therapy to prevent allograft rejection since the first successful renal transplants in the 1960s. Like MMF it is an anti-proliferative agent that acts by interfering with purine nucleotides. Azathioprine is metabolised to 6-thioguanine, which blocks DNA synthesis. Unlike MMF, this effect is non-specific and any proliferating cell type will be affected (see list of side effects below).

Azathioprine is usually used as part of triple immunosuppression in conjunction with a calcineurin inhibitor (Ciclosporin or Tacrolimus) and steroids. MMF is often substituted for azathioprine to allow for calcineurin inhibitor dose reduction or elimination.

Responsibilities of Nephrologist

- Assessment of the patient as fit enough to receive both an organ transplant and immunosuppressive treatment.
- Provision of information regarding immunosuppression, especially the risks and side effects, before the patient is placed on the national transplant waiting list.
- Prescription of an immunosuppressive regimen appropriate to the patient’s immunological history, and the condition of the organ to be transplanted.
- Indefinite follow-up of the patient and monitoring of immunosuppressive treatment.
- Provision of prophylaxis against opportunistic infection.
- To ensure that bone densitometry is performed at one year following transplantation where this is clinically appropriate.
- Provide recommendations for the management of cardiovascular risk, especially hypertension and hyperlipidaemia, and for the prevention of osteoporosis.
- Request participation in a shared care arrangement from the patient’s GP when the patient’s treatment has been stabilised and a shared care arrangement is clinically appropriate.
- Communication with GP as to management plan

Responsibilities of GP

- To contact the Transplant Unit to confirm that he/she is happy to accept the shared care arrangement within 28 days of receiving the request.
- Communication with Transplant Unit should the patient develop intercurrent illness.
- Prescription of immunosuppressive medications.
- Management of hypertension (target BP better than 130/80) in co-operation with Transplant Unit.
- Management of hyperlipidaemia (total cholesterol < 4mmol/L) in co-operation with Transplant Unit.
- Up-to-date cervical and breast screening in women.
- Pneumococcal and annual influenza vaccination. Avoid all live vaccines.

Responsibilities of Patient

- Compliance with prescribed medications and dietary advice, and regular Transplant Clinic attendance
- No smoking
- Modest alcohol consumption
<table>
<thead>
<tr>
<th>Azathioprine</th>
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<tbody>
<tr>
<td>Indication</td>
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<tr>
<td>Formulations and strengths available</td>
</tr>
</tbody>
</table>
| Cost (for 28 days treatment – December 2016) | 50mg daily £2.21  
100mg daily £4.4  
150mg daily £6.63 |
| Dose | Initial dose 1.5 mg/kg |
| Usual Dose Range | 25mg to 150mg, in single daily dose |
| Likely duration of treatment | Indefinite, as long as treatment is considered appropriate by specialist. |
| Contraindications | Known hypersensitivity to Azathioprine or 6-mercaptopurine. |
| Warnings | Pregnancy and breast feeding. Azathioprine may be used during planned pregnancy under specialist advice.  
**Avoid all live vaccines** (e.g. yellow fever, BCG, rubella, oral typhoid (rarely prescribed), MMR and live (oral) polio - inactivated polio vaccine may be used). |
| Side Effects (Full list in BNF) | Myelosuppression  
Hepatitis  
Pneumonitis  
Increased susceptibility to infection  
Increased risk of malignancy |
| Drug Interactions | **Dangerous interaction with allopurinol**  
Allopurinol inhibits azathioprine metabolism, leading to the accumulation of active metabolites and profound myelosuppression. In most transplant patients requiring allopurinol treatment, azathioprine should be replaced with Mycophenolate Mofetil (MMF). |
| Monitoring | FBC, U&E, LFT, glucose, lipids and BP in Transplant Clinic (see page 4). |
Prednisolone Shared Care Guideline

Introduction

Corticosteroids, like azathioprine, have been used as a component of immunosuppressive therapy to prevent allograft rejection since the first successful renal transplants in the 1960s. They act to inhibit the alloimmune response at multiple levels, but are relatively weak in comparison to the other immunosuppressive drugs in current use.

The side effects of long term corticosteroid use are well known (see below) and are the cause of considerable morbidity in transplant recipients. Modern immunosuppressive protocols aim to minimise corticosteroid exposure, and there is increasing evidence that steroids can be omitted completely from regimens including the potent drugs tacrolimus and MMF.

Responsibilities of Nephrologist

- Assessment of the patient as fit enough to receive both an organ transplant and immunosuppressive treatment.
- Provision of information regarding immunosuppression, especially the risks and side effects, before the patient is placed on the national transplant waiting list.
- Prescription of an immunosuppressive regimen appropriate to the patient’s immunological history, and the condition of the organ to be transplanted.
- Indefinite follow-up of the patient and monitoring of immunosuppressive treatment.
- Provision of prophylaxis against opportunistic infection.
- To ensure that bone densitometry is performed at one year following transplantation where this is clinically appropriate.
- Provide recommendations for the management of cardiovascular risk, especially hypertension and hyperlipidaemia, and for the prevention of osteoporosis.
- Request participation in a shared care arrangement from the patient’s GP when the patient’s treatment has been stabilised and a shared care arrangement is clinically appropriate.
- Communication of management plan to GP

Responsibilities of GP

- To contact the Transplant Unit to confirm that he/she is happy to accept the shared care arrangement within 28 days of receiving the request.
- Communication with Transplant Unit should the patient develop intercurrent illness.
- Prescription of immunosuppressive medications.
- Management of hypertension (target BP better than 130/80) in co-operation with Transplant Unit.
- Management of hyperlipidaemia (total cholesterol < 4mmol/L) in co-operation with Transplant Unit.
- Up-to-date cervical and breast screening in women.
- Pneumococcal and annual influenza vaccination. Avoid all live vaccines.

Responsibilities of Patient

- Compliance with prescribed medications and dietary advice, and regular Transplant Clinic attendance
- No smoking
- Modest alcohol consumption
<table>
<thead>
<tr>
<th>Prednisolone</th>
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<tbody>
<tr>
<td><strong>Indication</strong></td>
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<tr>
<td><strong>Formulations and strengths available</strong></td>
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<tr>
<td><strong>Cost (for 28 days treatment – December 2016)</strong></td>
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<tr>
<td></td>
</tr>
<tr>
<td><strong>Dose</strong></td>
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<tr>
<td><strong>Usual Dose Range</strong></td>
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<tr>
<td><strong>Likely duration of treatment</strong></td>
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<tr>
<td><strong>Contraindications</strong></td>
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<tr>
<td><strong>Warnings</strong></td>
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<tr>
<td><strong>Side Effects</strong> (Full list in BNF)</td>
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<tr>
<td><strong>Drug Interactions</strong></td>
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<tr>
<td><strong>Monitoring</strong></td>
</tr>
</tbody>
</table>
E. Contacts

1. Urgent advice and referrals

One Consultant Nephrologist is responsible for all acute referrals and in-patient nephrology, including transplantation, for each calendar month. The on-call Consultant can be contacted via the Hospital Switchboard (0191 233 6161), or individually as listed below. Urgent referrals or results may be faxed to the Nephrology ward (Ward 32) on 0191 213 7090.

There is always a Consultant Transplant Surgeon and a Renal SpR on-call, both contactable via switchboard.

2. Contact numbers

<table>
<thead>
<tr>
<th>Transplant ward (Ward 38)</th>
<th>0191 213 7538</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0191 213 7295 (fax)</td>
</tr>
<tr>
<td>Nephrology ward (Ward 32)</td>
<td>0191 213 7032</td>
</tr>
<tr>
<td></td>
<td>0191 213 7090 (fax)</td>
</tr>
<tr>
<td>Renal Clinical Investigation Unit (RCIU)</td>
<td>0191 213 7562</td>
</tr>
<tr>
<td>Renal Transplant Secretary</td>
<td>0191 223 1023</td>
</tr>
<tr>
<td></td>
<td>0191 223 1233 (fax)</td>
</tr>
<tr>
<td>Renal Pharmacist (Rachel Fraser)</td>
<td>0191 2448882</td>
</tr>
<tr>
<td>Freeman Hospital General Pharmacy</td>
<td>0191 2231458</td>
</tr>
<tr>
<td>Transplant Co-ordinators office</td>
<td>0191 223 1218</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Consultant Nephrologists</th>
<th>0191 213 7447</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prof D Manas</td>
<td>0191 223 1192</td>
</tr>
<tr>
<td>Prof D Talbot</td>
<td>0191 223 1351</td>
</tr>
<tr>
<td>Dr A Brown</td>
<td>0191 213 7636</td>
</tr>
<tr>
<td>Prof J A Sayer</td>
<td>0191 213 7149</td>
</tr>
<tr>
<td>Dr S Kanagasundaram</td>
<td>0191 213 7447</td>
</tr>
<tr>
<td>Dr C Tomson</td>
<td>0191 213 7093</td>
</tr>
<tr>
<td>Dr K Jones</td>
<td>0191 213 1023</td>
</tr>
<tr>
<td>Dr L A Baines</td>
<td>0191 223 1266</td>
</tr>
<tr>
<td>Prof N Sheerin</td>
<td>0191 213 1266</td>
</tr>
<tr>
<td>Dr R Fielding</td>
<td>0191 223 1266</td>
</tr>
<tr>
<td>Dr D Kavanagh</td>
<td>0191 213 7636</td>
</tr>
<tr>
<td>Dr E Montgomery</td>
<td>0191 223 1023</td>
</tr>
<tr>
<td>Mr J French</td>
<td>0191 223 1866</td>
</tr>
<tr>
<td>Prof S White</td>
<td>0191 223 7074</td>
</tr>
<tr>
<td>Mr G Sen</td>
<td>0191 213 7144</td>
</tr>
<tr>
<td>Mr D Rix</td>
<td>0191 223 1258</td>
</tr>
<tr>
<td>Mr C Wilson</td>
<td>0191 2231866</td>
</tr>
<tr>
<td>Mr T Dosani</td>
<td>0191 213 7090</td>
</tr>
</tbody>
</table>
**Institute of Transplantation**

**Kidney Transplant Immunosuppression Protocol**

<table>
<thead>
<tr>
<th>All renal transplants:</th>
<th>Except “High-Risk”** and steroid avoidance:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Basiliximab</strong> - 20mg pre-op and day 4</td>
<td><strong>Basiliximab</strong> - 20mg pre-op and day 4</td>
</tr>
<tr>
<td><strong>Methylprednisolone</strong> - 500mg at clamp release</td>
<td><strong>Methylprednisolone</strong> - 500mg at clamp release</td>
</tr>
<tr>
<td><strong>Tacrolimus (AdaPort)</strong> - 0.1mg/kg/day in 2 divided doses (target trough level 4-8ng/ml)</td>
<td><strong>Tacrolimus (AdaPort)</strong> - 0.15mg/kg/day in 2 divided doses (target trough level 8-12ng/ml)</td>
</tr>
<tr>
<td><strong>Mycophenolate Mofetil (MMF)</strong> - 1000mg bd (500 mg bd when tacrolimus therapeutic)</td>
<td><strong>MMF</strong> 1000mg bd (reduce to 750mg bd on discharge)</td>
</tr>
<tr>
<td><strong>Azathioprine</strong> 1.5mg/kg od may be used instead of MMF</td>
<td><strong>Prednisolone</strong> 20mg (omit if steroid avoidance)</td>
</tr>
<tr>
<td><strong>Prednisolone</strong> 20mg od</td>
<td><strong>High Risk is:</strong></td>
</tr>
<tr>
<td></td>
<td>Any transplant with 2 HLA DR mismatch</td>
</tr>
<tr>
<td></td>
<td>Previous graft loss to ACUTE rejection</td>
</tr>
<tr>
<td></td>
<td>Any patient with multiple HLA antibodies</td>
</tr>
</tbody>
</table>

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**Acute rejection:**

- **AUGMENT** with **Methylprednisolone** 500mg per day for 3 days
- **INCREASE** dose of **Tacrolimus*** to achieve trough level 8-12ng/ml
- **ADD** **Mycophenolate Mofetil** 1000mg bd if azathioprine used initially
- **CONTINUE or START** **Prednisolone** 20mg od

---

**Delayed Graft Function (or anticipated DGF):**

- Adjust **Tacrolimus*** to achieve trough level 2-4ng/ml
- Continue **MMF** 1000mg bd
- **CONTINUE** or **ADD** **Prednisolone** 20mg od
- When graft functions **INCREASE** **Tacrolimus** to trough level 4-8 ng/ml
- **then REDUCE** **MMF** to 500mg bd

---

**Tacrolimus:**

*AdaPort* is the preferred brand of tacrolimus for all renal transplants.

*Prograf* may be continued for patients already on this brand following a previous transplant.

*Advagraf* (once-daily modified release tacrolimus) may be used if problems with concordance are identified and a once-daily immunosuppressant regime is preferred. Refer to tacrolimus by its **brand name** in all documentation.

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**Prednisolone reduction:**

- 20mg od for 4 weeks then reduce by 2.5 - 5mg every 2 weeks, aiming for 5mg od final dose

**Cardiovascular disease:**

- All patients to be discharged on **Aspirin** 75mg od and either **Atorvastatin** 10mg od or preadmission statin

**Antibiotic prophylaxis:**

- **Co-trimoxazole** 480mg od for 6 months OR **Dapsone** 50 mg od in allergy or co-trimoxazole avoidance

**CMV:** See local guideline

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Updated: July 2011 – K Jones, R Fraser
August 2013 – K Jones, F Dowen, R Fraser
September 2016 – K Jones, R Fraser

**Review date:** September 2018
**Shared Care Request/Confirmation**

- Consultant to complete first section of form and send to patient’s GP.
- GP to complete second section of form and return to hospital consultant within 28 days.

A copy of the full shared care guideline can be viewed at [www.northoftyneapc.nhs.uk](http://www.northoftyneapc.nhs.uk)

<table>
<thead>
<tr>
<th>Consultant</th>
<th>Department</th>
<th>Hospital</th>
</tr>
</thead>
<tbody>
<tr>
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</tbody>
</table>

**Patient Details (use hospital label if preferred)**

- Name ...........................................................
- Address ......................................................
- Postcode ........................... Sex ...........
- Hosp. Reg. No. ............... DOB ...........

**Treatment Requested for Prescribing in Accordance with an Approved Shared Care Arrangement:**

- Drug Name ..............................................
- Dose .......... Frequency ............................
- Other Information (if appropriate) ..........................................................
  ...........................................................................................................

**Signed (Hosp. Dr) ......................... Name (print) ................ Date ...............**

---

**To be completed by GP**

- Please tick one box

- I ACCEPT the proposed shared care arrangement for this patient [ ]
- I ACCEPT the proposed shared care arrangement with the caveats below [ ]
- I DO NOT ACCEPT the proposed shared care arrangement for this patient [ ]

  My caveats / reason(s) for not accepting include:
  ...........................................................................................................
  ...........................................................................................................

**Signed ........................................ Name (print) ................ Date .............**

*(Patients GP)*

**N.B.** Participation in this shared care arrangement implies that prescribing responsibility is shared between the hospital consultant and the patient’s GP