

## **SECTION M SCOTTISH RENAL BIOPSY REGISTRY: SURVEY OF TRANSPLANT KIDNEY BIOPSY IN SCOTLAND 2017**

All centres in Scotland were able to provide date of procedure, date of birth, sex, and main diagnosis for all transplant renal biopsies performed in the calendar year 2017. Biopsy diagnosis was selected from a bespoke codeset agreed by the SRR Biopsy Steering Group (see M4 below). Centres also provided indication for biopsy, selected from pre-defined terms. Biopsies at the time of transplant ('implantation biopsies', 'time zero biopsies') were not included.

The total number of reported transplant biopsies was 278 in 222 patients giving an incidence of 51.2 transplant biopsies per million population (pmp) down from 59.0 pmp in 2016 and 70.6 pmp in 2015. 278 transplant biopsies amounts to 0.10 biopsies per prevalent transplant recipient using the Scottish Renal Registry reported prevalent transplant patient data from 31/12/2016 and this is down from 0.12 in 2016.

Total number of biopsies and total number of patients having transplant renal biopsy in each centre were expressed pmp and per prevalent transplant patient and for each centre based on the populations shown in table 1.

Some centres perform no transplant biopsies or only a proportion of the transplant biopsies for patients from their NHS Health Board area with the others being performed at the relevant transplant centre. For this reason all analyses include a comparison of the NHS Health Board areas served by the Glasgow (West) transplant unit (A&A, D&G, GG&C, FV, LAN) and Edinburgh (East) transplant unit (GRAM, SHET, ORKN, TAY, HIGH, WI, LOTH, BORD, FIFE).

| <b>M1 Number of transplant kidney biopsies by renal unit and NHS Health Board</b> |                    |                 |  |                               |                                     |                              |  |   |
|---|--------------------|-----------------|--|-------------------------------|-------------------------------------|------------------------------|--|---|
| Renal unit  | NHS Health Board   | Population 2017 | Prevalent transplant patients 31/12/2016 | Total transplant biopsies (n) | Total number patients having biopsy | Transplant biopsies pmp/year | Patients having transplant biopsies pmp/year | Transplant biopsies per prevalent transplant patient/yr |
| <b>ARI</b>  | GRAM + SHET + ORKN | 631460          | 311                                      | 31                            | 21                                  | 49.1                         | 33.3   | 0.10  |
| <b>XH</b>   | A&A                | 370410          | 214                                      | 6                             | 6                                   | 16.2                         | 16.2   | 0.03  |
| <b>DGRI</b>   | D&G                | 149200          | 75                                       | 0                             | 0                                   | 0.0                          | 0.0  | 0.00  |
| <b>Glas</b>   | GG&C + FV          | 1474690         | 876                                      | 99                            | 84                                  | 67.1                         | 57.0   | 0.11  |
| <b>Monk</b>   | LAN                | 658130          | 385                                      | 0                             | 0                                   | 0.0                          | 0.0  | 0.00  |
| <b>Nine</b>   | TAY                | 416090          | 202                                      | 14                            | 11                                  | 33.6                         | 26.4   | 0.07  |
| <b>Raig</b>   | HIGH + WI          | 348940          | 203                                      | 6                             | 6                                   | 17.2                         | 17.2   | 0.03  |
| <b>RIE</b>  | LOTH + BORD        | 1004470         | 437                                      | 108                           | 88                                  | 107.5                        | 87.6   | 0.25  |
| <b>VHK</b>  | FIFE               | 371410          | 169                                      | 14                            | 10                                  | 37.7                         | 26.9   | 0.08  |
| <b>East</b>   |                    | 2772370         | 1322                                     | 167                           | 134                                 | 60.2                         | 48.3   | 0.13  |
| <b>West</b>   |                    | 2652430         | 1550                                     | 105                           | 88                                  | 39.6                         | 33.2   | 0.07  |
| <b>Scotland</b>   |                    | <b>5424800</b>  | <b>2872</b>                              | <b>278</b>                    | <b>222<sup>a</sup></b>              | <b>51.2</b>                  | <b>40.9</b>                                  | <b>0.10</b>   |

a. 4 patients had a transplant biopsy in 2 different centres during 2017 which is why the numbers from individual centres do not add up exactly to the numbers in the East/West and Overall columns.

Some centres perform no transplant biopsies or only a proportion of the transplant biopsies for patients from their NHS Health Board area with the others being performed at the relevant transplant centre. For this reason, all analyses include a comparison of the NHS Health Board areas served by the Glasgow (West) transplant unit (A&A, D&G, GG&C, FV, LAN) and Edinburgh (East) transplant unit (GRAM, SHET, ORKN, TAY, HIGH, WI, LOTH, BORD, FIFE).

## Time since transplant.

Time since the most recent transplant was categorised according to pre-defined clinically meaningful periods as shown in Table M2.

| M2 Time from transplant to biopsy in 2017 |     |    |      |      |      |      |      |     |     |      |      |          |
|---|-----|----|------|------|------|------|------|-----|-----|------|------|----------|
|   | ARI | XH | DGRI | GLAS | MONK | NINE | RAIG | RIE | VHK | East | West | Scotland |
| 1-28 days                                 | 1   | 0  | 0    | 16   | 0    | 1    | 0    | 59  | 1   | 62   | 16   | 78       |
| 1-3 months                                | 7   | 0  | 0    | 15   | 0    | 3    | 5    | 16  | 0   | 31   | 15   | 46       |
| 3-12 months                               | 8   | 0  | 0    | 18   | 0    | 4    | 1    | 10  | 2   | 25   | 18   | 43       |
| 1-5 years                                 | 8   | 2  | 0    | 31   | 0    | 3    | 0    | 14  | 6   | 31   | 33   | 64       |
| 5-10 years                                | 5   | 2  | 0    | 14   | 0    | 2    | 0    | 7   | 5   | 19   | 16   | 35       |
| >10 years                                 | 2   | 2  | 0    | 5    | 0    | 1    | 0    | 2   | 0   | 5    | 7    | 12       |

## Indication for transplant biopsy

Indication for transplant renal biopsy is shown in M3. There were 2 biopsies without a recorded indication.

| M3 Indication for transplant biopsy 2017                      |     |    |      |      |      |      |      |     |     |      |      |          |
|---|-----|----|------|------|------|------|------|-----|-----|------|------|----------|
|   | ARI | XH | DGRI | GLAS | MONK | NINE | RAIG | RIE | VHK | East | West | Scotland |
| Surveillance during delayed graft function                    | 0   | 0  | 0    | 5    | 0    | 0    | 0    | 20  | 0   | 20   | 5    | 25       |
| Achieved transplant function lower than expected              | 3   | 0  | 0    | 0    | 0    | 3    | 0    | 19  | 0   | 25   | 0    | 25       |
| AKI   | 17  | 0  | 0    | 39   | 0    | 4    | 4    | 29  | 12  | 66   | 39   | 105      |
| Assessment of response to treatment of rejection              | 6   | 0  | 0    | 0    | 0    | 2    | 0    | 6   | 0   | 14   | 0    | 14       |
| Assessment of response to BK virus treatment                  | 0   | 0  | 0    | 0    | 0    | 1    | 0    | 1   | 0   | 2    | 0    | 2        |
| Protocol (surveillance) biopsy                                | 0   | 0  | 0    | 0    | 0    | 0    | 2    | 10  | 1   | 13   | 0    | 13       |
| Chronically deteriorating transplant function and proteinuria | 3   | 4  | 0    | 13   | 0    | 0    | 0    | 6   | 0   | 9    | 17   | 26       |
| Chronically deteriorating transplant function only            | 1   | 2  | 0    | 35   | 0    | 3    | 0    | 12  | 0   | 16   | 37   | 53       |
| Preserved transplant function and proteinuria                 | 0   | 0  | 0    | 1    | 0    | 0    | 0    | 0   | 0   | 0    | 1    | 1        |
| Nephrotic Syndrome  | 0   | 0  | 0    | 0    | 0    | 0    | 0    | 2   | 0   | 2    | 0    | 2        |
| Other (specify)   | 1   | 0  | 0    | 5    | 0    | 1    | 0    | 3   | 0   | 5    | 5    | 10       |

## Histopathological diagnosis.

Nephrologists were asked to select the diagnosis that was the main explanation for the clinicopathological features. The reported diagnoses are shown in Table M4.

| M4 Transplant biopsy histopathological diagnosis 2017 |     |    |      |      |      |      |      |     |     |      |      |          |
|---|-----|----|------|------|------|------|------|-----|-----|------|------|----------|
|   | ARI | XH | DGRI | GLAS | MONK | NINE | RAIG | RIE | VHK | East | West | Scotland |
| Acute tubulodegenerative change (ATN)                 | 0   | 0  | 0    | 16   | 0    | 1    | 0    | 27  | 1   | 29   | 16   | 45       |
| Rejection: ACR (1A)                                   | 5   | 0  | 0    | 10   | 0    | 0    | 0    | 8   | 1   | 14   | 10   | 24       |
| Rejection: ACR (1B)                                   | 0   | 0  | 0    | 6    | 0    | 0    | 0    | 0   | 0   | 0    | 6    | 6        |
| Rejection: ACR (2A, 2B, 3)                            | 1   | 1  | 0    | 12   | 0    | 2    | 0    | 5   | 0   | 8    | 13   | 21       |
| Rejection: ACR (NOS)                                  | 0   | 0  | 0    | 0    | 0    | 0    | 0    | 0   | 0   | 0    | 0    | 0        |
| Rejection: borderline                                 | 0   | 0  | 0    | 3    | 0    | 0    | 1    | 9   | 2   | 12   | 3    | 15       |
| Rejection: acute / active ABMR                        | 1   | 0  | 0    | 3    | 0    | 0    | 0    | 2   | 0   | 3    | 3    | 6        |
| Rejection: chronic ABMR                               | 0   | 0  | 0    | 6    | 0    | 1    | 0    | 1   | 0   | 2    | 6    | 8        |
| Rejection: chronic allograft arteriopathy             | 0   | 0  | 0    | 0    | 0    | 0    | 0    | 0   | 0   | 0    | 0    | 0        |
| Rejection: chronic, active ABMR                       | 1   | 1  | 0    | 6    | 0    | 0    | 0    | 2   | 0   | 3    | 7    | 10       |
| Rejection: mixed ABMR & ACR                           | 5   | 1  | 0    | 4    | 0    | 0    | 0    | 0   | 0   | 5    | 5    | 10       |
| Rejection - other                                     | 0   | 0  | 0    | 0    | 0    | 0    | 0    | 0   | 0   | 0    | 0    | 0        |
| BKVAN   | 2   | 1  | 0    | 9    | 0    | 0    | 0    | 6   | 0   | 8    | 10   | 18       |
| CNI toxicity  | 6   | 0  | 0    | 0    | 0    | 0    | 0    | 1   | 0   | 7    | 0    | 7        |
| Donor disease   | 0   | 0  | 0    | 4    | 0    | 2    | 0    | 13  | 0   | 15   | 4    | 19       |
| IFTA  | 7   | 0  | 0    | 5    | 0    | 2    | 1    | 8   | 3   | 21   | 5    | 26       |
| IIFTA   | 1   | 0  | 0    | 0    | 0    | 0    | 0    | 1   | 1   | 3    | 0    | 3        |
| Infection (other than BKVAN)                          | 0   | 0  | 0    | 0    | 0    | 0    | 0    | 2   | 0   | 2    | 0    | 2        |
| Recurrent native disease                              | 1   | 0  | 0    | 1    | 0    | 2    | 0    | 6   | 0   | 9    | 1    | 10       |
| Insufficient tissue for diagnosis                     | 0   | 0  | 0    | 2    | 0    | 0    | 2    | 4   | 0   | 6    | 2    | 8        |
| No significant histopathological abnormality          | 0   | 0  | 0    | 2    | 0    | 3    | 0    | 8   | 2   | 13   | 2    | 15       |
| Not stated  | 0   | 0  | 0    | 0    | 0    | 0    | 0    | 0   | 1   | 1    | 0    | 1        |
| Other   | 1   | 2  | 0    | 10   | 0    | 1    | 2    | 5   | 3   | 12   | 12   | 24       |

ACR = acute cellular rejection, 1A, 1B, 2A, 2B, 3 refer to Banff classification

ABMR = antibody mediated rejection

BKVAN = BK virus associated nephropathy

CNI = calcineurin inhibitor

IFTA = interstitial fibrosis and tubular atrophy

IIFTA = inflammatory interstitial fibrosis and tubular atrophy

## Major Complications

Complications were categorised as shown in table M5. There was only 1 major complication (0.36%) with no loss of transplant kidney or death.

| <b>M5 Major complications</b>           |          |
|---|----------|
| <b>Complication</b>                     | <b>n</b> |
| Arteriography and embolisation          | 0        |
| Arteriography no embolisation           | 1        |
| Blood transfusion only                  | 0        |
| Clot obstruction managed conservatively | 0        |
| Clot obstruction requiring intervention | 0        |
| Death                                   | 0        |
| Nephrectomy                             | 0        |
| Other please specify                    | 0        |
| Surgery no nephrectomy                  | 0        |
| <b>Total</b>                            | <b>1</b> |

This is the third consecutive analysis of all transplant renal biopsies in Scotland in a calendar year. Analysing the data by region (East v West) again demonstrates a higher incidence of transplant biopsies in the East region (60.2 v 39.6 pmp) despite a higher incidence of kidney transplantation in the West region. The difference in incidence between East and West is accounted for mainly by biopsies in the first 3 months after transplant and is also partly accounted for by repeat biopsies in the same patients since the difference in incidence of patients having at least one transplant biopsy in the two regions is closer (48.3 v 33.2 pmp). The analysis of indication and histopathological diagnosis suggests a lower clinical threshold for performing transplant biopsy in the East region; the incidences of biopsy for 'surveillance during delayed graft function', 'achieved function lower than expected', 'AKI', 'assessment of response to treatment of acute rejection' were higher in the East. Similarly, the incidences of 'no significant histopathological abnormality', 'ATN', and borderline acute rejection were higher in the East but the incidences of definite acute rejection categories and BKVAN were very similar.