Non-invasive voiding assessment in conscious mice

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Supplemental Figure 1

Macro code for visual basic editor in Excel®

```vb
Sub detect_and_calculate_mict_volume
'detects micturition based on increase of max value and provided previous line was NOT a micturition
Range("J28:J700").Formula = "=IF((average(I28:I29)-
average(I25:I27)>=$B$17)*AND(SUM(J25:J27)=0)*AND((average(I29:I31)-average(I38:I40))>=$B$20),1,0)"
'edits actual micturition volume
Range("K28:K700").Formula = "=IF(J28=1,(AVERAGE(I29:I33)-AVERAGE(I24:I27)),)"
End Sub
```

Code for MatLab®

```matlab
% This code reads .csv murine micturition data (weight vs. time) for each mouse and
% outputs a 26x6 CELL object of the mouse number, number of micturitons,  mean
% micturition volume, max void volume, total micturition volume, and number of
% small voids.

D = csvread('Micturition_Data_Full.csv');
mice = [587047 587049 587050 587051 587052 587053 587613 587614 587615
587616 587617 587620 587621 587622 587623 587990 587991 587992 587993
587994 587995 587996 587997 587998 587999];

output = cell(length(mice)+1,6);

for i = 1:length(mice)
    I = D(2:674,i); % start at row 2 to avoid title
    I = I';        % in Visual Basic Editor we index from these equivalent
                   % cells: J28 to J700

    % cell values (constants):
    B14 = 0.05; % small void threshold
    B17 = 0.02; % solid material threshold
    B20 = 0.015; % threshold decrease from minute 1-3 to 8-11

    % This will be the updated data column for J (1 = micturition, 0 = no micturition)
    J = zeros(length(I)-12);
    J = J(:,1);
    J = J';

    %% column J translates to:
    for z = 5:(length(J)-12)
        if (mean(I(z:z+1)) - mean(I(z-3:z-1))) >= B17
            if sum(I(z-3:z-1)) == 0;
                if (mean(I(z+1:z+3)) - mean(I(z+10:z+12))) >= B20
                    J(z) = 1; % a micturition is counted
                else
                    J(z) = 0; % a micturition is not counted
                end
            else
                J(z) = 0; % a micturition is not counted
            end
        else
            J(z) = 0; % a micturition is not counted
        end
    end

    % take the transpose of J to output J values into a column instead of row: J = J';

    % For data column 'number of micturitions' in the Excel sheet (micturition volumes)
    K = zeros(length(J)-5);
    K = K(:,1);
    K = K';

    %% column K translates to:
    for j = 5:length(K)
        if J(j) == 1
            k = mean(I(j+1:j+5)) - mean(I(j-4:j-1));
            K(j) = k; % micturition volume recorded
        else
            K(j) = 0;
        end
    end

    % take the transpose of K to output K values into a column instead of row:
    K = K';

    % This algorithm avoids double counting if there are two mass increases right
    % beside each other

    for j = 1:(length(K)-1)
        if j <= 60 % begin recording micturitions after 60 minutes
            K(j) = 0;
        end
%       if K(j) > 0 && K(j+1) >0
%           K(j+1) = 0;
%       end
    end
    %% Total number of micturitions
    count = 0;
    for j = 1:length(K)
        if K(j) > 0
            count = count + 1;
        end
    end
    %% Total micturition volume
    volumes = [];
    for j = 1:length(K)
        if K(j) > 0
            volumes = [volumes, K(j)];
        end
    end
    %%
    if isempty(volumes)
        volumes = 0;
    end
    %%  Number of small voids
    small_voids = 0;
    for j = 1:length(K)
        if K(j) >0
            if K(j) <= B14
                small_voids = small_voids + 1;
            end
        end
    end
    %%
    output{1,1} = 'Mouse number';
    output{1,2} = '# of Ms';
    output{1,3} = 'Mean M volume';
    output{1,4} = 'Max void';
    output{1,5} = 'Total M volume';
    output{1,6} = '# of small voids';

    output{i+1,1} = num2str(mice(i));
    output{i+1,2} = count;
    output{i+1,3} = mean(volumes);
    output{i+1,4} = max(volumes);
    output{i+1,5} = sum(volumes);
    output{i+1,6} = small_voids;

end
disp('M = micturition')
disp(output)
```

Figure S1. Macro code for visual basic editor in Excel and code for MatLab®.