Optimal imaging time points considering accuracy and precision of Patlak linearization for ^{89}Zr-immuno-PET: a simulation study

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SUPPLEMENTAL 1

The in-house written MATLAB function below was used for the Patlak linearization calculations. Activity concentration in plasma (`ACp`), activity concentration in tissue (`ACt`) and time between moment of injection and moment of measurement (`time`) were used as input. The function provides as output the linear regression fit (`lin_fit`) obtained from the build-in MATLAB function polyval, the calculated Patlak simulated K_i value (`Ki`), the calculated Patlak V_T value (`Vt`) and the R-squared of the linear regression fit (`Rsqr`).

```
function [lin_fit,Ki,Vt,Rsqr] = patlak_calc(ACp,ACt,time)
%% Patlak linearization: ACt/ACp = Ki*(AUCp/ACp)+Vt

% AUCp: area under the ACp curve from time of injection to time of
measurement
AUCp = cumtrapz(time,ACp); % numerical integration

% Calculate Patlak x and y values
ACtACp = ACt./ACp;
AUCpACp = AUCp./ACp;

% Calculate Ki and Vt with fitting linear regression (based on least
squares)
stFit = find(time>=24); %indices of time more than 24 hours
stFit = stFit(1);
[coeff,S] = polyfit(AUCpACp(stFit:end),ACtACp(stFit:end),1); %first order
because linear, ignore first datapoint
[lin_fit] = polyval(coeff(:),AUCpACp(stFit:end),S);

Ki = coeff(1)*1000; %from mL/g/h to microL/g/h
Vt = coeff(2);

% R^2 of linear fit
Rsqr = 1-(S.normr/norm(ACtACp-mean(ACtACp)))^2;
end
```