Supporting Information

Supporting information for *Repeatability of IVIM biomarkers from diffusion-weighted MR imaging in head and neck: Bayesian probability versus neural network.*

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Examples of regions of interest

Supporting Information Figure 1S: ADC maps with examples of the regions of interest indicated.
### Supporting Information

#### Table 1: Wilcoxon signed-rank test p-values, comparing paired wCV values of the methods for $D_t$.

|          | PTERGID | TONSIL | PTERGID | TONSIL | PTERGID | TONSIL | Bayesian | p-value |
|----------|---------|--------|---------|--------|---------|--------|----------|---------|
| Nonlinear Least Squares | 0.004 | 0.131 | 0.002 | 0.020 | 0.004 | 0.002 | Intra-Session | 0.05 |
| Bayesian | 0.004 | 0.193 | 0.010 | 0.049 | 0.037 | 0.084 | Inter-Session | p-value |
| IVIM-NET | 0.275 | 0.160 | 0.027 | 0.193 | 0.160 | 0.557 | Intra-Session | 0.00 |
|          | 0.770 | 0.193 | 0.064 | 0.492 | 0.492 | 0.010 | Inter-Session | p-value |

#### Table 2: Wilcoxon signed-rank test p-values, comparing paired wCV values of the methods for $D_p$.

|          | PTERGID | TONSIL | PTERGID | TONSIL | PTERGID | TONSIL | Bayesian | p-value |
|----------|---------|--------|---------|--------|---------|--------|----------|---------|
| Nonlinear Least Squares | 0.105 | 0.004 | 0.002 | 0.002 | 0.002 | 0.002 | Intra-Session | 0.05 |
| Bayesian | 0.014 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 | Inter-Session | p-value |
| IVIM-NET | 0.064 | 0.625 | 0.375 | 0.020 | 0.014 | 0.695 | Intra-Session | 0.00 |
|          | 0.105 | 0.131 | 0.020 | 0.105 | 0.049 | 0.084 | Inter-Session | p-value |

#### Table 3: Wilcoxon signed-rank test p-values, comparing paired wCV values of the methods for $f_p$.

|          | PTERGID | TONSIL | PTERGID | TONSIL | PTERGID | TONSIL | Bayesian | p-value |
|----------|---------|--------|---------|--------|---------|--------|----------|---------|
| Nonlinear Least Squares | 0.625 | 0.006 | 0.922 | 0.002 | 0.006 | 0.064 | Intra-Session | 0.05 |
| Bayesian | 0.006 | 0.002 | 1.000 | 0.002 | 0.006 | 0.846 | Inter-Session | p-value |
| IVIM-NET | 0.064 | 0.020 | 0.002 | 0.014 | 0.695 | 0.002 | Intra-Session | 0.00 |
|          | 0.695 | 0.375 | 0.006 | 0.002 | 0.002 | 0.492 | Inter-Session | p-value |

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*Table 15: Wilcoxon signed-rank test p-values, comparing paired wCV values of the methods for $D_t$.*

*Table 25: Wilcoxon signed-rank test p-values, comparing paired wCV values of the methods for $D_p$.*

*Table 35: Wilcoxon signed-rank test p-values, comparing paired wCV values of the methods for $f_p$.***
**Neural network inconsistencies in parametric maps.**

Below are some notable examples of visual differences between instances of the neural networks. Maps of all instances for both IVIM-NET and IVIM-NET\textsubscript{mod} have also been included.

Supporting Information Figure 2S: Example of $D_t$ maps from three instances of IVIM-NET with similar distribution but different absolute values.

Supporting Information Figure 3S: Example of $D_p$ maps from four instances of IVIM-NET: two with similar distribution but different values (instance 1 and 2) and two with a different distribution (instance 5 and 11).

Supporting Information Figure 4S: Example of $D_p$ maps from three instances of IVIM-NET\textsubscript{mod} with different values.
Parametric IVIM maps

100 instances of IVIM-NET

(Set your PDF viewer to single page view for easy comparison.)
Network instance 1
Network instance 5

- $D_p$ (mm$^2$/s)
- $D_t$ (mm$^2$/s)
- $f_p$
- $S_0$
Network instance 6
Network instance 10
Network instance 13

Images show different parameters:
- **D_p (mm^2/s)**
- **D_t (mm^2/s)**
- **f_p**
- **S_0**
Network instance 15

- $D_p \text{ (mm}^2/\text{s})$
- $D_t \text{ (mm}^2/\text{s})$
- $f_p$
- $S_o$
Network instance 19

- **D_p (mm^2/s)**
  - Range: 0.000 to 0.150

- **D_t (mm^2/s)**
  - Range: 0.000 to 0.002

- **f_p**
  - Range: 0.0 to 0.7

- **S_0**
  - Range: 0.0
Network instance 20
Network instance 21
Network instance 24

Dp (mm²/s)

Dt (mm²/s)

fp

So
Network instance 25
Network instance 26

![Images of network instance 26 with different parameters: Dp (mm²/s), Dt (mm²/s), fp, and So.](image)
Network instance 27
Network instance 28
Network instance 29

- $D_p$ (mm$^2$/s)
- $D_t$ (mm$^2$/s)
- $f_p$
- $S_0$
Network instance 31

- $D_p$ (mm$^2$/s)
- $D_t$ (mm$^2$/s)
- $f_p$
- $S_0$
Network instance 33

![Four images showing different metrics: $D_p$ (mm$^2$/s), $D_t$ (mm$^2$/s), $f_p$, and $S_0$.](Image)
Network instance 34
Network instance 35

- $D_p$ (mm$^2$/s)
- $D_t$ (mm$^2$/s)
- $f_p$
- $S_0$
Network instance 36

- $D_p$ (mm$^2$/s)
- $D_t$ (mm$^2$/s)
- $f_p$
- $S_0$
Network instance 37

- $D_p$ (mm$^2$/s)
- $D_t$ (mm$^2$/s)
- $f_p$
- $S_0$
Network instance 39

- **D_p (mm²/s)**: Scale from 0.000 to 0.150
- **D_t (mm²/s)**: Scale from 0.000 to 0.002
- **f_p**: Scale from 0.0 to 0.7
- **S_0**: Scale from 0.0 to 0.0
Network instance 40

- $D_p (\text{mm}^2/\text{s})$ with values from 0.000 to 0.150
- $D_t (\text{mm}^2/\text{s})$ with values from 0.000 to 0.002
- $f_p$ with values from 0.0 to 0.7
- $S_0$, scaled from 0.0 to x
Network instance 42

![Images showing diffusion properties](image-url)
Network instance 44

- $D_p$ (mm$^2$/s)
- $D_t$ (mm$^2$/s)
- $f_p$
- $S_0$
Network instance 47

- $D_p$ (mm$^2$/s)
- $D_t$ (mm$^2$/s)
- $f_p$
- $S_0$
Network instance 49

- $D_p$ (mm$^2$/s)
- $D_t$ (mm$^2$/s)
- $f_p$
- $S_0$
Network instance 50

- $D_p$ (mm$^2$/s)
- $D_t$ (mm$^2$/s)
- $f_p$
- $S_0$
Network instance 51

- $D_p$ (mm$^2$/s)
- $D_t$ (mm$^2$/s)
- $f_p$
- $S_0$
Network instance 52

- $D_p$ (mm$^2$/s)
- $D_t$ (mm$^2$/s)
- $f_p$
- $S_0$
Network instance 53

- $D_p$ (mm$^2$/s)
- $D_t$ (mm$^2$/s)
- $f_p$
- $S_0$
Network instance 55

- $D_p$ (mm$^2$/s) scale: 0.000 to 0.150
- $D_t$ (mm$^2$/s) scale: 0.000 to 0.002
- $f_p$ scale: 0.0 to 0.7
- $S_0$ scale: 0.0 to x
Network instance 56

- $D_p$ (mm$^2$/s)
- $D_t$ (mm$^2$/s)
- $f_p$
- $S_0$
Network instance 58

- $D_p$ (mm$^2$/s)
- $D_t$ (mm$^2$/s)
- $f_p$
- $S_0$
Network instance 59

- $D_p$ (mm²/s)
- $D_t$ (mm²/s)
- $f_p$
- $S_0$
Network instance 60

\[ D_p (\text{mm}^2/\text{s}) \]

\[ D_t (\text{mm}^2/\text{s}) \]

\[ f_p \]

\[ S_0 \]
Network instance 61

![Images showing D_p and D_t with scale bars for each parameter.]

- $D_p$ (mm$^2$/s)
- $D_t$ (mm$^2$/s)
Network instance 63

- $D_p$ (mm$^2$/s)
- $D_t$ (mm$^2$/s)
- $f_p$
- $S_0$
Network instance 64

- $D_p$ (mm$^2$/s)
- $D_t$ (mm$^2$/s)
- $f_p$
- $S_0$
Network instance 66

$D_p \text{ (mm}^2/\text{s})$

$D_t \text{ (mm}^2/\text{s})$

$f_p$

$S_0$
Network instance 68
Network instance 69

![Image of network instance 69 with different parameters: $D_p$ (mm²/s), $D_t$ (mm²/s), $f_p$, and $S_0$.](image-url)
Network instance 70

- $D_p$ (mm$^2$/s)
- $D_t$ (mm$^2$/s)
- $f_p$
- $S_0$
Network instance 71
Network instance 73

- $D_p$ (mm$^2$/s)
- $D_t$ (mm$^2$/s)
- $f_p$
- $S_0$
Network instance 75

D_p (mm^2/s)

D_t (mm^2/s)

f_p

S_0
Network instance 76

![Image of network instances](image-url)
Network instance 77
Network instance 78
Network instance 79

- $D_p$ (mm$^2$/s)
- $D_t$ (mm$^2$/s)
- $f_p$
- $S_0$
Network instance 80

- $D_p$ (mm$^2$/s)
- $D_t$ (mm$^2$/s)
- $f_p$
- $S_0$
Network instance 82

- $D_p (\text{mm}^2/\text{s})$
- $D_t (\text{mm}^2/\text{s})$
- $f_p$
- $S_0$
Network instance 85
Network instance 86

\[ D_p (\text{mm}^2/\text{s}) \]

\[ D_t (\text{mm}^2/\text{s}) \]

\[ f_p \]

\[ S_0 \]
Network instance 87

\[ D_p (\text{mm}^2/\text{s}) \]

\[ D_t (\text{mm}^2/\text{s}) \]

\[ f_p \]

\[ S_0 \]
Network instance 90

- $D_p$ (mm²/s)
- $D_t$ (mm²/s)
- $f_p$
- $S_0$
Network instance 91

[Images of MR scans with color bars for D_p (mm^2/s) and D_t (mm^2/s)]
Network instance 92

\(D_p \text{ (mm}^2/\text{s})\)

\(D_t \text{ (mm}^2/\text{s})\)

\(f_p\)

\(S_0\)
Network instance 93

- $D_p$ (mm$^2$/s)
- $D_t$ (mm$^2$/s)
- $f_p$
- $S_0$
Network instance 94
Network instance 95
Network instance 97

![Images showing diffusion coefficient maps]
Parametric IVIM maps

100 instances of IVIM-NET_{mod}

(Set your PDF viewer to single page view for easy comparison.)
Network instance 1

- $D_p$ (mm$^2$/s)
- $D_t$ (mm$^2$/s)
- $f_p$
- $S_0$
Network instance 2
Network instance 3

- $D_p$ (mm$^2$/s) scale
- $D_t$ (mm$^2$/s) scale
- $f_p$ scale
- $S_0$ scale
Network instance 4
Network instance 5

Graph showing diffusion images with scales for $D_p$ (mm²/s) and $D_t$ (mm²/s) along with labels for $f_p$ and $S_0$. The images display different patterns, indicating variations in diffusion properties.
Network instance 10

- $D_p$ (mm$^2$/s)
- $D_t$ (mm$^2$/s)
- $f_p$
- $S_0$
Network instance 11

![Images of flow and diffusion tensors with labels Dp (mm^2/s), Dt (mm^2/s), fp, and S0.](image-url)
Network instance 14

- $D_p$ (mm$^2$/s)
- $D_t$ (mm$^2$/s)
- $f_p$
- $S_0$
Network instance 15

- $D_p$ (mm$^2$/s)
- $D_t$ (mm$^2$/s)
- $f_p$
- $S_0$
Network instance 16
Network instance 19

- $D_p$ (mm$^2$/s)
- $D_t$ (mm$^2$/s)
- $f_p$
- $S_0$
Network instance 20

\[ D_p (\text{mm}^2/\text{s}) \]

\[ D_t (\text{mm}^2/\text{s}) \]

\[ f_p \]

\[ S_0 \]
Network instance 21
Network instance 22

**Images:**
- Upper left: Map of $D_p$ (mm$^2$/s)
- Upper right: Map of $D_t$ (mm$^2$/s)
- Lower left: Map of $f_p$
- Lower right: Map of $S_0$

**Scale:**
- $D_p$ (mm$^2$/s) scale: 0.000 to 0.150
- $D_t$ (mm$^2$/s) scale: 0.000 to 0.002
- $f_p$ scale: 0.0 to 0.7
- $S_0$ scale: 0.0
Network instance 29
Network instance 30

\[ D_p (\text{mm}^2/\text{s}) \]

\[ D_t (\text{mm}^2/\text{s}) \]

\[ f_p \]

\[ S_0 \]
Network instance 31
Network instance 32

![Images showing network instance 32 with color bars indicating values of $D_p$ (mm$^2$/s) and $D_t$ (mm$^2$/s).]
Network instance 33

$D_p$ (mm$^2$/s)

$D_t$ (mm$^2$/s)

$f_p$

$S_0$

$x$
Network instance 34
Network instance 35

- $D_p (\text{mm}^2/\text{s})$
- $D_t (\text{mm}^2/\text{s})$
- $f_p$
- $S_0$
Network instance 37

D_p (mm^2/s)

D_t (mm^2/s)

f_p

S_0
Network instance 38

![Images of two sets of images with scales for $D_p$ (mm$^2$/s) and $D_t$ (mm$^2$/s), along with scales for $f_p$ and $S_0$.]
Network instance 39
Network instance 42

- $D_p$ (mm$^2$/s)
- $D_t$ (mm$^2$/s)
- $f_p$
- $S_0$
Network instance 46

![Images showing different parameters: $D_p$ (mm$^2$/s), $D_t$ (mm$^2$/s), $f_p$, and $S_0$.](image_url)
Network instance 47
Network instance 48

- $D_p$ (mm$^2$/s)
- $D_t$ (mm$^2$/s)
- $f_p$
- $S_0$
Network instance 49

- $D_p$ (mm$^2$/s)
- $D_t$ (mm$^2$/s)
- $f_p$
- $S_0$
Network instance 51

- $D_p$ (mm$^2$/s)
- $D_t$ (mm$^2$/s)
- $f_p$
- $S_0$
Network instance 55
Network instance 56

- $D_p$ (mm$^2$/s)
- $D_t$ (mm$^2$/s)
- $f_p$
- $S_0$
Network instance 57

![Images showing different parameters: $D_p$, $D_t$, $f_p$, and $S_0$.]
Network instance 58

![Images of network instance 58 showing different parameters and data:]
- $D_p$ (mm$^2$/s) with a scale from 0.000 to 0.150
- $D_t$ (mm$^2$/s) with a scale from 0.000 to 0.002
- $f_p$ with a scale from 0.0 to 0.7
- $S_0$ with a scale from 0.0 to x
Network instance 59

\[ D_p \text{ (mm}^2/\text{s}) \]

\[ D_t \text{ (mm}^2/\text{s}) \]

\[ f_p \]

\[ S_0 \]
Network instance 61

- $D_p$ (mm$^2$/s)
- $D_t$ (mm$^2$/s)
- $f_p$
- $S_0$
Network instance 63
Network instance 64

- $D_p$ (mm$^2$/s)
- $D_t$ (mm$^2$/s)
- $f_p$
- $S_0$
Network instance 66

\[ D_p \text{ (mm}^2\text{/s)} \]

\[ D_t \text{ (mm}^2\text{/s)} \]

\[ f_p \]

\[ S_0 \]
Network instance 69

- $D_p$ (mm$^2$/s)
- $D_t$ (mm$^2$/s)
- $f_p$
- $S_0$
Network instance 70

D_p (mm^2/s)

D_t (mm^2/s)

f_p

S_o
Network instance 71

D_p (mm^2/s)

D_t (mm^2/s)

f_p

S_0
Network instance 74
Network instance 75

![Image of network instance 75 with two graphs showing diffusion and perfusion parameters. The graphs display values for $D_p$ and $D_t$ in mm$^2$/s, and $f_p$ and $S_0$.](image-url)
Network instance 76

- $D_p$ (mm$^2$/s)
- $D_t$ (mm$^2$/s)
- $f_p$
- $S_0$
Network instance 78

- $D_p$ (mm$^2$/s)
  - Range: 0.000 to 0.150
- $D_t$ (mm$^2$/s)
  - Range: 0.000 to 0.002
- $f_p$
  - Range: 0.0 to 0.7
- $S_0$
  - Range: 0.0 to x
Network instance 79

![Image of network instance 79 with labeled components: $D_p$ (mm$^2$/s), $D_t$ (mm$^2$/s), $f_p$, $S_0$.](image-url)
Network instance 80

D_p (mm^2/s)

D_t (mm^2/s)

f_p

S_0
Network instance 82

- $D_p$ (mm$^2$/s)
- $D_t$ (mm$^2$/s)
- $f_p$
- $S_0$
Network instance 84
Network instance 88

- $D_p$ (mm$^2$/s)
  - Range: 0.000 to 0.150

- $D_t$ (mm$^2$/s)
  - Range: 0.000 to 0.002

- $f_p$
  - Range: 0.0 to 0.7

- $S_0$
  - Range: 0.0
Network instance 89
Network instance 90

- $D_p$ (mm$^2$/s)
- $D_t$ (mm$^2$/s)
- $f_p$
- $S_0$
Network instance 91

- $D_p$ (mm$^2$/s)
  - Range: 0.000 to 0.150

- $D_t$ (mm$^2$/s)
  - Range: 0.000 to 0.002

- $f_p$
  - Range: 0.0 to 0.7

- $S_0$
  - Range: 0.0
Network instance 92
Network instance 94

- $D_p \text{ (mm}^2/\text{s})$
- $D_t \text{ (mm}^2/\text{s})$
- $f_p$
- $S_0$
Network instance 96

![Images of network instance 96 showing D_p (mm^2/s), D_t (mm^2/s), f_p, and S_0.]
Network instance 98

\[ D_p (\text{mm}^2/\text{s}) \]

\[ D_t (\text{mm}^2/\text{s}) \]

\[ f_p \]

\[ S_0 \]
Network instance 100

\[ D_p \text{ (mm}^2/\text{s}) \]

\[ D_t \text{ (mm}^2/\text{s}) \]

\[ f_p \]

\[ S_0 \]