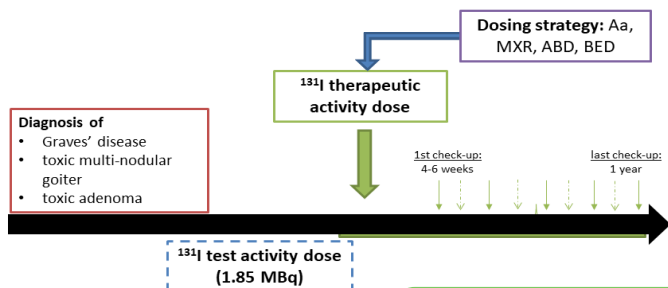


The influence of biologically effective dose (BED) on the ^{131}I therapy response in patients with benign thyroid disease – nonlinear mixed effect modelling approach



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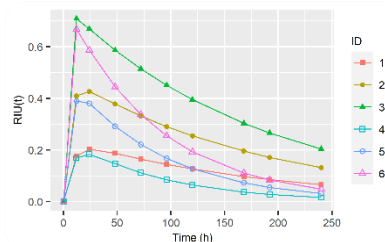
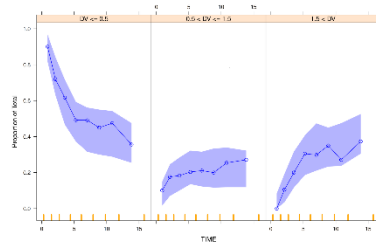


Characteristic	number (%) /median (range)	Aa of ^{131}I [MBq]	413.56 (185 – 1300)
Age [years]	61 (37 – 83)	ABD [Gy]	191.1 (43.79 – 2078.7)
Sex [female]	80 (84.21)	BED [Gy]	299.91 (57.19 – 20843.0)
Clinical diagnosis		MXR [Gy/h]	0.67 (0.27 – 11.96)
Graves' disease	57 (60.00)	Outcome 1 year after therapy	
toxic multi-nodular goiter	22 (23.16)	hyperthyroidism	32 (33.68)
toxic adenoma	16 (16.84)	euthyroidism	29 (30.52)
THVOL [cm ³]	32.28 (2.36 – 106.27)	hypothyroidism	34 (35.78)
TSH [mIU/l]	0.05 (0.01 – 10.94)	therapy response assessments per patient	5 (1-8)
fT ₄ [pmol/l]	29.92 (7.72 – 104.20)		

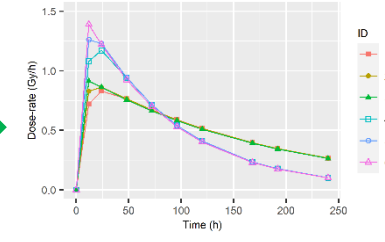
Final model

$$\text{logit}[P(Y \geq 1)] = -5.22 + [\ln(\text{BED}) * 1.21 * e^{\eta}] * (1 - e^{-t*0.275}) + (1 - (\text{THVOL}/32.28))^{1.57} \quad \omega^2 = 0.420$$

$$\text{logit}[P(Y \geq 2)] = -5.22 - 1.23 * (1 + 4.87 * \text{IND}_{\text{DG}}) + [\ln(\text{BED}) * 1.21 * e^{\eta}] * (1 - e^{-t*0.275}) + (1 - (\text{THVOL}/32.28))^{1.57}$$



targeting BED



VIDEO

• Topic Vučenović V, Rajkovača Z, Jelić D, Stanimirović D, Vučević K, Miljković B, Vučićević K. Investigation of factors influencing radiiodine (^{131}I) biokinetics in patients with benign thyroid disease using nonlinear mixed effects approach. *Eur J Clin Pharmacol.* 2018;74(8):1037-1045.
 • European Commission. Council Directive 2013/59/Euratom laying down basic safety standards for protection against the dangers arising from exposure to ionising radiation, and repealing Directives 89/618/Euratom, 90/641/Euratom, 96/29/Euratom, 97/43/Euratom and 2003/122/Euratom (2014). *Official Journal of the European Union L13/2014* 57:1-73. doi:10.3000/19770677.L_2014.013.eng
 • Ross DS, Burch HB, Cooper DS, Greenlee MC, Laurberg P, Maia AL, Rivkees SA, Samuels M, Sosa JA, Stan MN, Walter MA 2016 American Thyroid Association Guidelines for Diagnosis and Management of Hyperthyroidism and Other Causes of Thyrotoxicosis. *Thyroid* 2016;26(10):1343-1421.