Identification and Evaluation of a Dynamic Ozone-FEV_1 Exposure-Response Model For Use in Conducting Risk Assessment in Support of the NAAQS for Ozone

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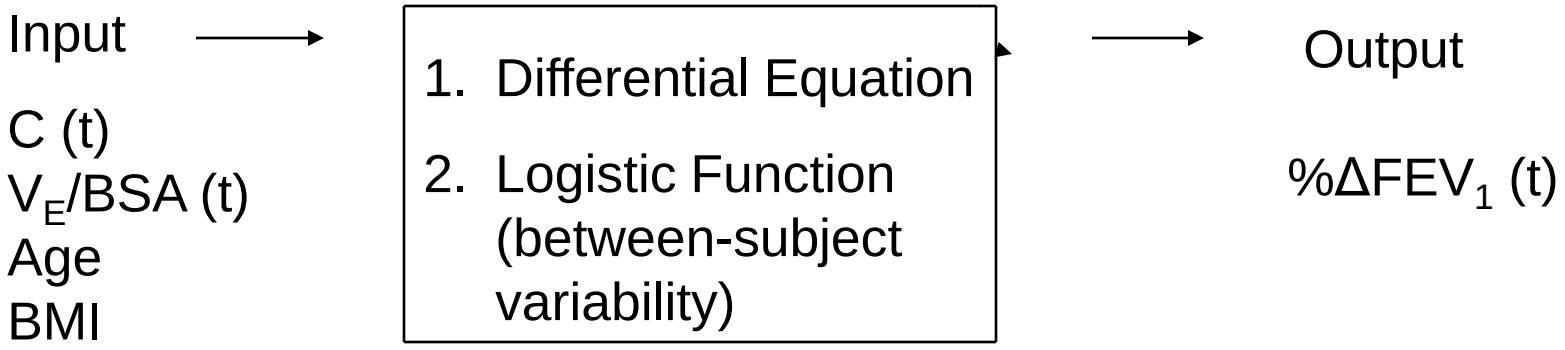
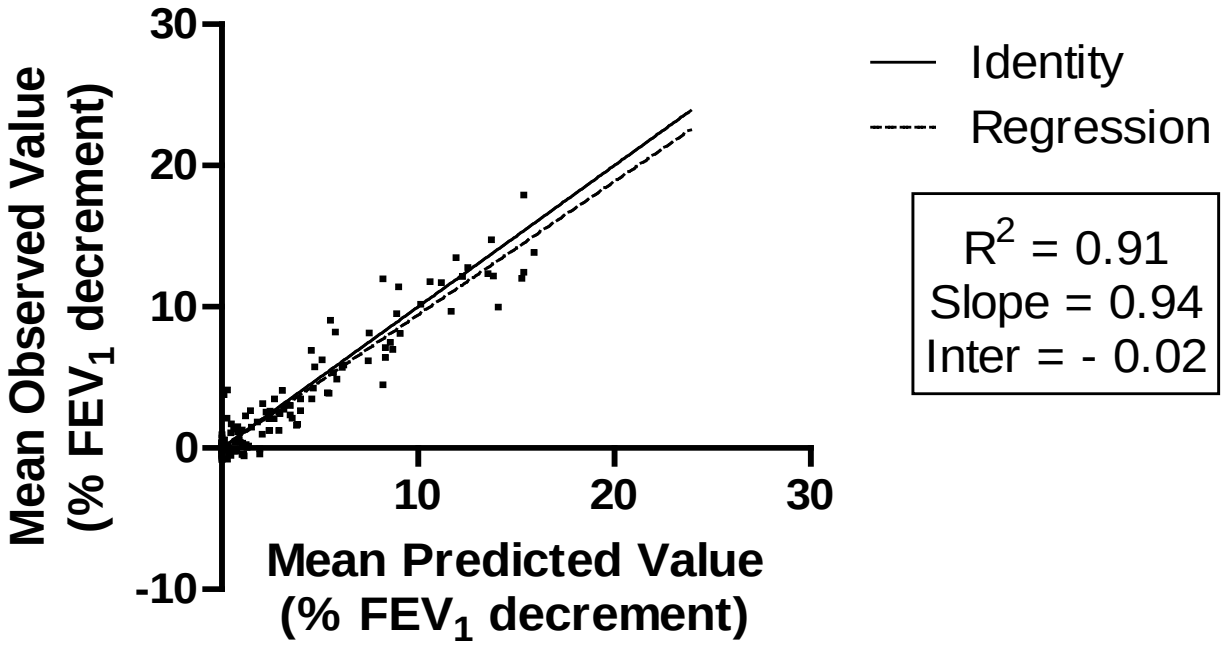
Ozone – FEV_1 Exposure-Response Model



Population characteristics of response (e.g. mean, median, %ile, proportion with response greater than X%, etc) can be calculated for any output value.

n-Fold Cross Validation - 15 EPA Studies

(mean observed vs. mean predicted FEV_1 %decrements)



C = 0.08 – 0.4 ppm

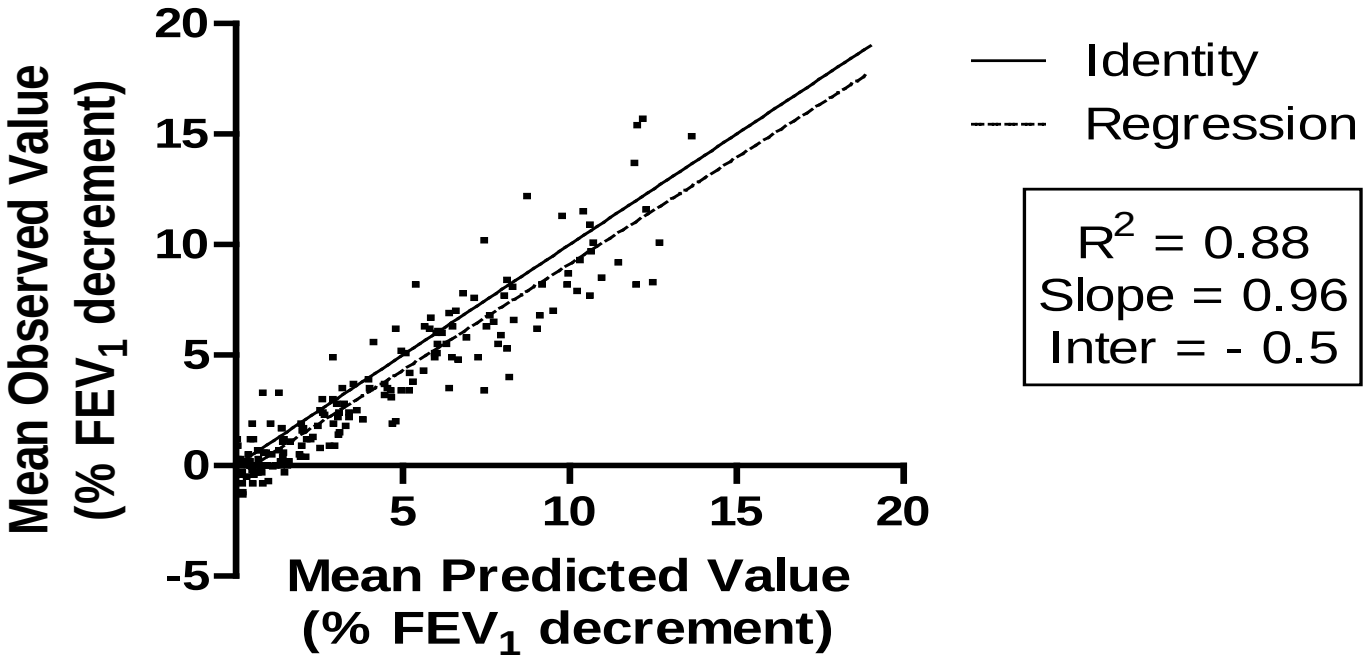
Ages 18-35 yrs

Activity = Rest – Heavy Exercise

Duration = 1-6.6 hr

Application of Model to 7 Independent Studies

(mean observed vs. mean predicted FEV_1 %decrements



C = 0.04 – 0.12 ppm

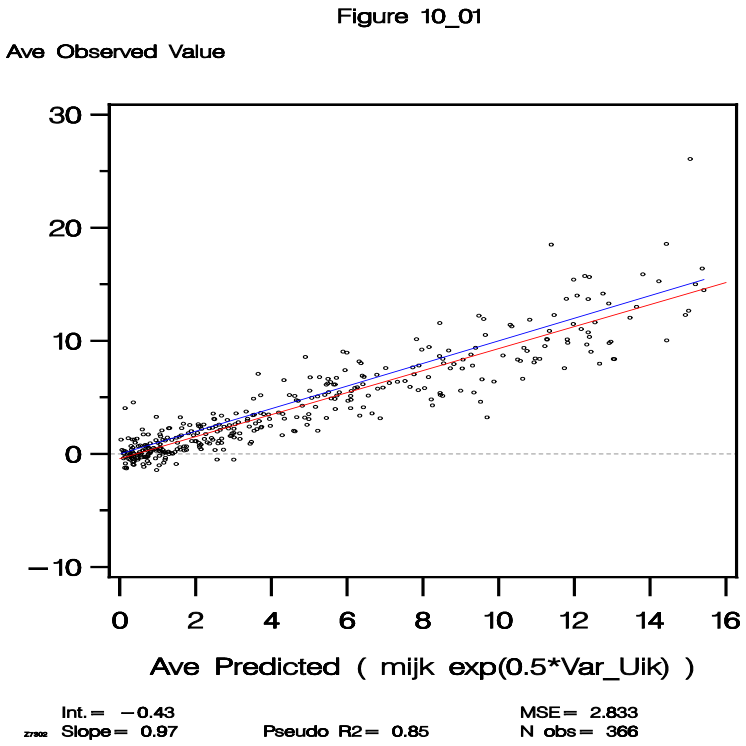
Ages 18-35 yrs

Activity = Strenuous Exercise

Duration = 1-8 hr

Fit of Model to 23 Studies

(mean observed vs. mean predicted FEV_1 %decrements)



Identity

Regression

$R^2 = 0.85$

Slope = 0.97

Inter = -0.43

C = 0.04 – 0.40 ppm

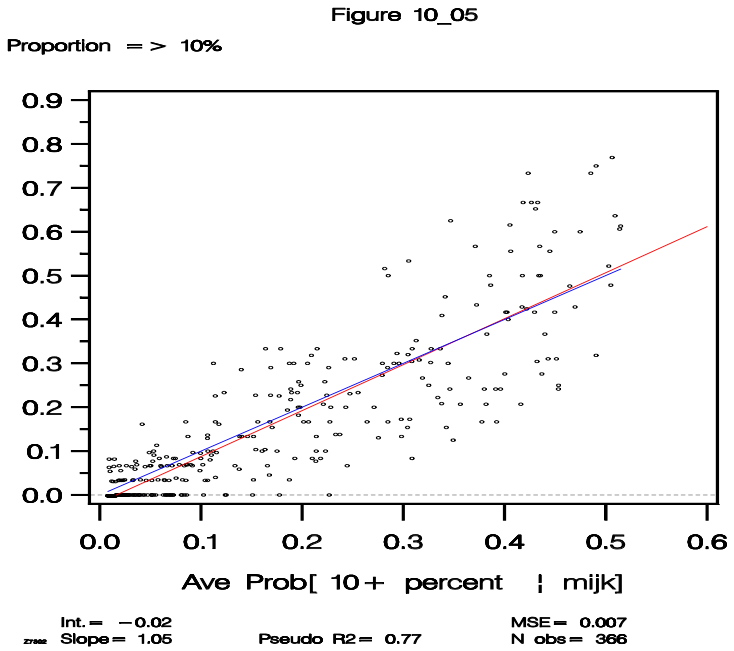
Ages 18-35 yrs

Activity = Rest - Heavy Exercise

Duration = 1-8 hr

Model Predictions for 23 Studies

(observed vs. predicted proportion of participants with FEV_1 %decrements > 10%)



Identity

Regression

$R^2 = 0.77$
Slope = 1.05
Inter = -0.02

C = 0.04 – 0.40 ppm

Ages 18-35 yrs

Activity = Rest - Heavy Exercise

Duration = 1-8 hr

Conclusions

- Dynamic model that predicts population FEV_1 response for healthy individuals, ages 18-35 yr, exposed over a wide range of variable exposure conditions
- This model could serve as the foundation for a new health risk model in the upcoming EPA risk assessment for ozone.
- I recommend discussion of this model in the ISA for a possible role in the EPA RA for ozone.