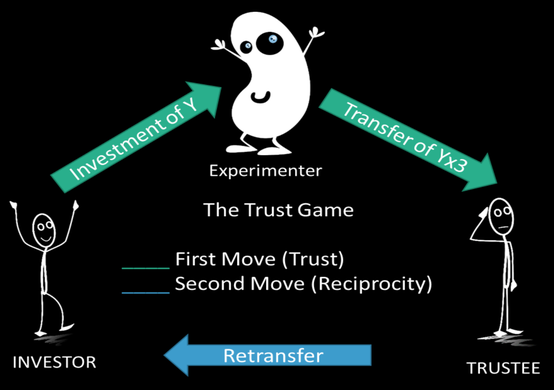
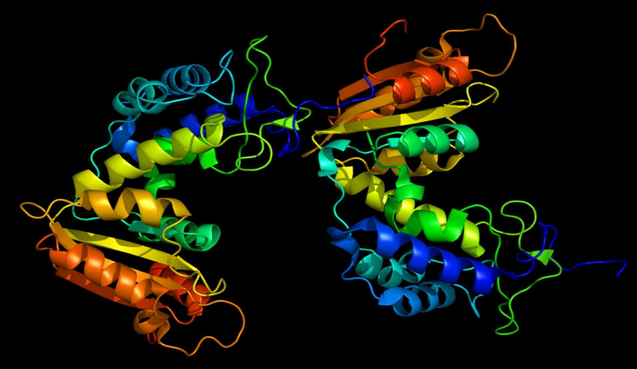


The Influence of Vitamin A administration on Oxytocin Levels and Human Trust Behavior

Grünhage, T.; Felten, A.; Plieger, T., Lippold, J.V. & Reuter, M.
University of Bonn, Institute of Psychology, Kaiser-Karl-Ring 9, 53111 Bonn
E-Mail: thomas.gruenhage@uni-bonn-diff.de



Introduction

- The relevance of Trust which pervades nearly every aspect of our social lives has long been acknowledged all across human sciences.
- In searching for potential biological foundations of trust, the neuropeptide oxytocin (OT) has consistently been linked to trust-related variables
- OT was shown to influence…
  - Clinical phenomena
    - BPD (1)
    - Autism (2; 3; 4; 5)
  - Social Cognition
    - improves the ability to detect the mental state of another individual from social cues of the eye region (6)
    - improves identity-recognition in rodents and humans as well as memory for emotionally valent faces in humans (7; 8; 9; 10)
    - improves emotion detection, especially for anxious facial expressions (11; 12; 13)
    - enhances attention on the emotionally salient eye-region in healthy humans, ASD-patients and even rhesus-monkeys (5; 14; 15)
    - Recent findings do not generally support a uniformly positive influence of OT on mind-reading and emotion-recognition. Instead, a number of moderating variables were identified, clustering into properties of the environment or rather stimuli and personal properties (16; 17)
  - Attachment
    - Levels of plasma OT predict the self-assessed attachment to one's own parents and mother's care for their infants (18; 19)
    - plasma OT-levels are positively related to partner-support and physical contact with the partner while showing negative relationships with physiological stress-symptoms as heart-rate, blood-pressure and plasma-norepinephrine levels (20; 21)
    - OT-Levels and OXTR-density are associated with massive discrepancies in maternal and social behaviour across different species of rodents (22; 23; 24; 25)
  - Trust
    - OT-levels are reactive to Trust-signals (26)
    - OT-administration increases Trust-behavior and inverts the effects of breaches of Trust (27; 28)

- CD38
  - Glycoprotein
  - Homologous to ADP-Ribosyl Cyclase
  - Catalyzes the metablosim of cyclic ADP-Ribose (cADPR) and nicotinic acide adenine dinucleotide phosphate (NAADP)
  - Both mobilize Ca2+ of intracellular stores which stimulates the exocytosis of OT (29; 30)
  - CD38-KO-mice show a specific deficit in OT-secretion as well as lower levels of cADPR and NAADP (31)
  - KO-mice show massive impairments in social recognition and maternal behavior
  - Those effects are counteracted by OT (31; 32)
  - In humans, associations between polymorphisms of the CD38-gene and OT-related outcomes have been reported, encompassing OT-levels, processing of social stimuli and autism-risk (33; 34; 35)
  - CD38-mRNA-level correlate with the IQ, social and communicative abilities of autistic patients (36)

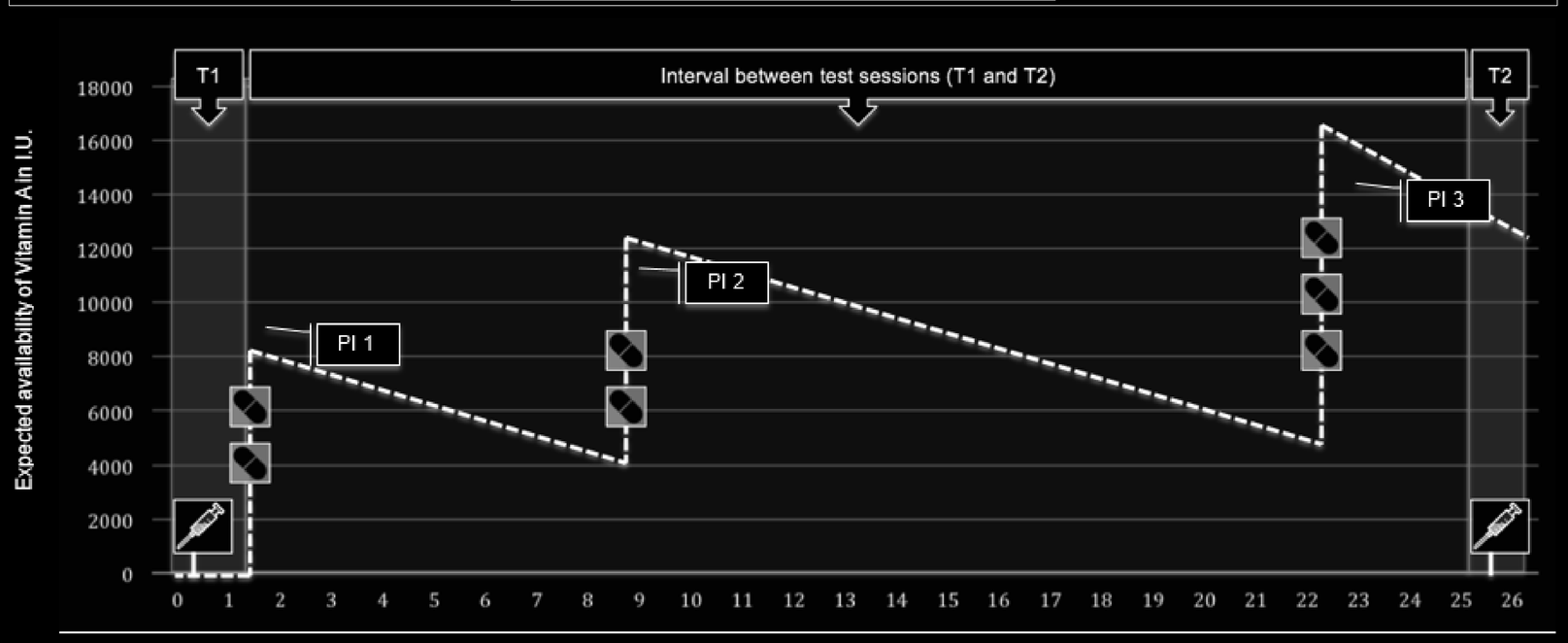
Hypothesis

Oral application of vitamin A in an effective dose leads to enhanced OT-Levels and consequently to more trusting behavior in the Trust-Game, while leaving behavior in a nonsocial Lottery-Game unaffected.

Methods

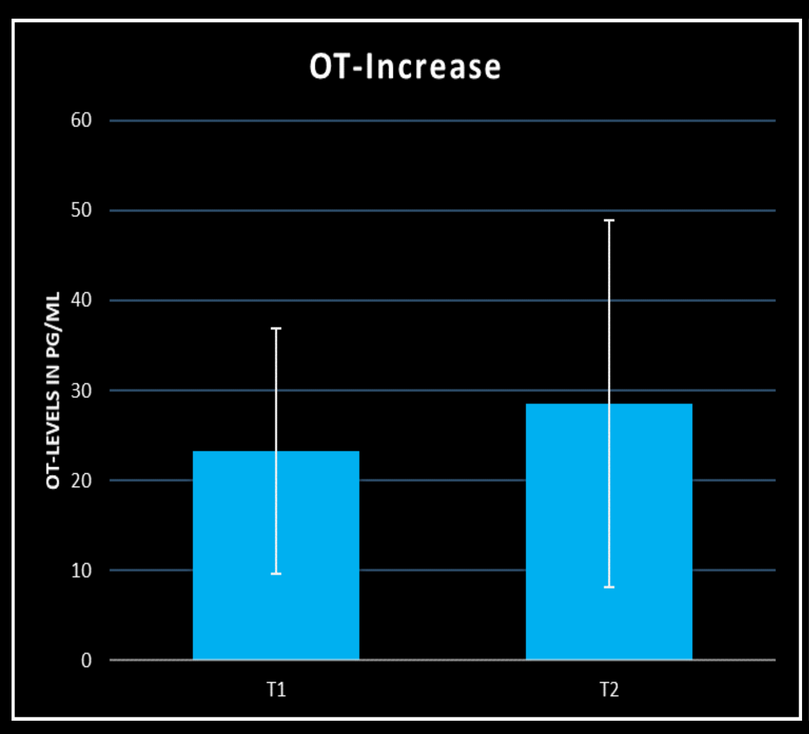
- Procedure
  - Day 1:
    - Blood samples of 3 ml were taken (T1)
    - Trust- and Lottery-Games were played before two pills of retinyl palmitate were taken in
    - 9h later, participants took in two pills
  - Day 2:
    - Three additional pills were taken in 22.5h after T1
    - 2:50h later, Trust- and Lottery-Games were played again
    - 25.5h after T1, the second blood-samples were taken
- Pharmacological Manipulation
  - Participants (N=23) took in 28.000 IU retinyl palmitate (half-life: 9.1h). 12.972 IU should be active at T2
- Biochemical analysis
  - OT was extracted from plasma with C18 SEP-columns and measured in duplicate by by fluorescent enzyme-linked immunosorbent assay

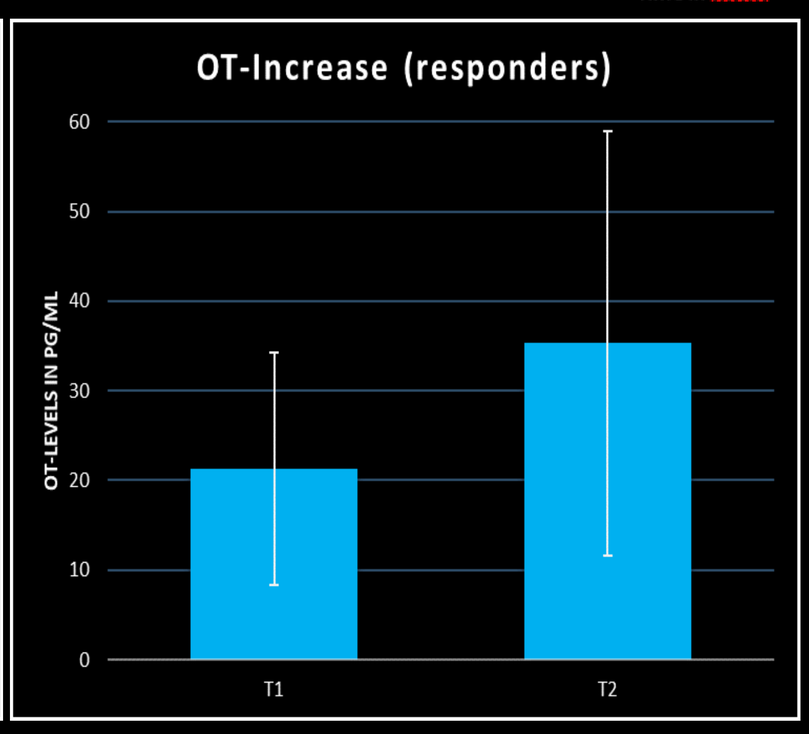
Results and Discussion



- Vitamin A intake resulted in an increase in plasma-OT-levels from 23.3 to 28.49 pg/ml, however the effect was not statistically significant ($F_{(1,22)}$= 1.83, p=.190)
- Likewise, Trust- ($F_{(1,22)}$= .01, p=.929), Trustworthiness- ($F_{(1,21)}$= .10, p=.762) and Risk-scores ($F_{(1,21)}$= .21, p=.650) did not change significantly over time.

Correlations	OT-Level T1	OT-Level T2	OT-Difference (T2-T1)
Trust T1	r = .042; p = .848	r = .242; p = .266	r = .235; p = .281
Trust T2	r = .100; p = .649	r = .183; p = .402	r = .128, p = .562
Difference (T2-T1)	r = .065; p = .769	r = -.086; p = .698	r = -.141; p = .521
Trustworthiness T1	r = -.242; p = .278	r = -.233; p = .298	r = -.076; p = .736
Trustworthiness T2	r = .078; p =.725	r = -.004; p = .984	r = -.062; p = .780
Difference (T2-T1)	r = .365; p = .095	r = .267; p = .229	r = .023; p = .918
Risk T1	r = .188; p = .402	r = .015; p = .948	r = -.122; p = .587
Risk T2	r = .158; p = .484	r = .084; p = .712	r = -.024; p = .914
Difference (T2-T1)	r = -.041; p = .858	r = .114; p = .612	r = .156; p = .489





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