

Pharmacodynamics of psychotropic drugs

Student's state of the art lecture at the 7th Advanced Postgraduate Course (3rd training session) of the European Academy of Medicine of the Aging, Sion, Switzerland, January 28 – February 1, 2008

Reinhard Lindner

Centre for Geriatrics and Gerontology Albertinen Haus, Hamburg, Germany

Centre for Therapy and Studies of Suicidal Behavior, University Hospital Hamburg-Eppendorf, Germany

This presentation aims to develop a model of influencing factors on the pharmacodynamics of psychotropic drugs in the elderly.

Pharmacodynamics is, together with pharmacokinetics and pharmacogenomics a field of pharmacology. It is defined as the study of the biochemical and physiological effects of drugs and the mechanisms of drug action and the relationship between drug concentration and effect. The focus of psychotropic drugs, which generally include drugs with beneficial and adverse psychoactive effects, is laid on antidepressives, neuroleptics and benzodiazepines.

Based on a literature survey, factors influencing the pharmacodynamics of these drug families in old age are extracted. They are factors

- (1) related to the normal aging process, (such as the increase of neurotransmitters, the reduction of the receptor number, the receptor binding affinity, several postreceptor events, as well as a reduction in homeostatic reserve)
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- (3) related to interactions with other drugs (especially with hepatic metabolism)

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Von Moltke L, Abernethy DR, Greenblatt DJ (2004) Kinetics and Dynamics of Psychotropic Drugs in the Elderly. In: Salzman C (ed) *Clinical Geriatric Psychopharmacology*. Philadelphia: Lippincott Williams & Wilkins, pp 87-114

Pharmacodynamics of psychotropic drugs

Student's state of the art lecture at the 7th Advanced Postgraduate Course (3rd training session) of the European Academy of Medicine of the Aging, Sion, Switzerland, January 28 – February 1, 2008

Reinhard Lindner

Centre for Geriatrics and Gerontology Albertinen Haus, Hamburg, Germany

Centre for Therapy and Studies of Suicidal Behavior, University Hospital Hamburg-Eppendorf, Germany

This presentation aims to develop a model of influencing factors on the pharmacodynamics of psychotropic drugs in the elderly.

Pharmacodynamics is, together with pharmacokinetics and pharmacogenomics a field of pharmacology. It is defined as the study of the biochemical and physiological effects of drugs and the mechanisms of drug action and the relationship between drug concentration and effect. The focus of psychotropic drugs, which generally include drugs with beneficial and adverse psychoactive effects, is laid on antidepressives, neuroleptics and benzodiazepines.

Based on a literature survey, factors influencing the pharmacodynamics of these drug families in old age are extracted. They are factors

- (1) related to the normal aging process, (such as the increase of neurotransmitters, the reduction of the receptor number, the receptor binding affinity, several postreceptor events, as well as a reduction in homeostatic reserve)
- (2) related to pathological changes in mentally and physically ill patients, including multimorbidity, (such as the reduced intracerebral blood flow with dementia (MID), or the decrease in 5 HT_{2A}-Receptor levels in elderly depressed patients, but also systemic effects on the the anticholinergic and (nor)adrenergic system, or intracellular effects)
- (3) related to interactions with other drugs (especially with hepatic metabolism)

The model will be critically discussed: a clinically relevant pharmacodynamic model should be enlarged through pharmacokinetic and pharmacogenomic aspects. Also psychological aspects, such as the subjective perception of drug effects should be taken into consideration.

Literature

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Lindner R, Fiedler G, Gans I, Gerisch B, Götze P, Richter M (2003) Medikation In der analytisch orientierten Psychotherapie suizidaler Patienten. In: Götze P, Schaller S (eds) *Psychotherapie der Suizidalität. Forschung – Theorie – Praxis*. Regensburg: Roderer-Verlag, pp 152-164

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