Strategic research on natural products and herbs for brain and cognitive functions

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Research and Development of Traditional Medicines and Natural Products

Systematic screening:
- Published literature on traditional medicinal plant use
- Historical texts

Advantages:
- Preselection of potentially active resources
- Promising safety profile (age-long experience)
- Cost-efficient and comparatively fast

Perspectives:
- Research and Development
- Quality Control and Production

Research and Development

Development of the test substance

Define:
- Active substance (in phytopharmacy: native extract)
- Dosage form

Establish:
- Physico-chemical profile (active compounds, marker)

Investigate:
- Pharmacology
- Mode of action

Pay attention to:
- Continuous availability
- Quality variations
- Sustainable cultivation / harvesting
- Biodiversity regulations
- Existing patent and intellectual property rights
Quality Control and Production

Identity test, controls

Monographs in pharmacopoeias for:
- Chemical substances
- Herbal raw materials

Organisation of a monograph
Definition: chemical characterisation
Characters: appearance, solubility
Identification: microscopy, physico-chemical tests
Tests: qualitative analysis
Assay: quantitative analysis
Impurities: chemical or microbiological impurities

Quality Control and Production

In house controls
Two standard analytical methods in phytopharmacy:
- TLC = Thin layer chromatography
- HPLC = High performance liquid chromatography

Safety consumption and the efficacy of herbal products

Preclinical development

In vitro profiling:
- Biochemical assays (e.g. enzyme activity assays)
- Cell culture assays (e.g. cancer cell lines)
- Isolated tissue assays (e.g. mucosa model)

In vitro toxicology:
Investigate potential toxic effects
in bacteria- or cell cultures

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Safety consumption and the efficacy of herbal products

Preclinical development (continued)

Pharmacokinetic studies
What does the body to the drug?
Investigate:
- Liberation
- Absorption
- Distribution
- Metabolism
- Excretion

Pharmacodynamic studies
What does the drug to the body?
Investigate:
- Physiological effects
- Drug action
- Relationship between drug concentration and effect

QUALITY CONTROL
- Validation report
- Stability report
- Manufacturing protocol
- Development report (ongoing)
**Clinical Development**

**Phase I**
- 20 to 30 healthy volunteers
- Investigate: Safety and tolerability, Pharmacokinetics, Pharmacodynamics

**Phase II**
- 100 to 500 patient volunteers
- Investigate: Safety and tolerability, Pharmacokinetics, Pharmacodynamics, Efficiency, Dosage to effect relationship

**Phase III**
- Up to 1000 or more patient volunteers
- Monitor reaction to long term drug use.
- Study design: Comparison to placebo or to standard therapy, Multicentre and multinational trials

**Phase IV**
- Post marketing testing
- Investigate specific questions within the frame of the approved indication: Expanded benefit-risk-profile, Combination with other drugs, Optimization (e.g. dosage, application)

Thank you very much for your attention.