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LIDER Roadmapping Workshop on:
**Content Analytics and Linked Data in Healthcare
and Medicine**

Munich, July 13, 2015

In urgent need:
Preclinical Decision Support System to Enhance
the Chances of Success for Experimental
Therapies in Clinical Translation

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Department of Neurology



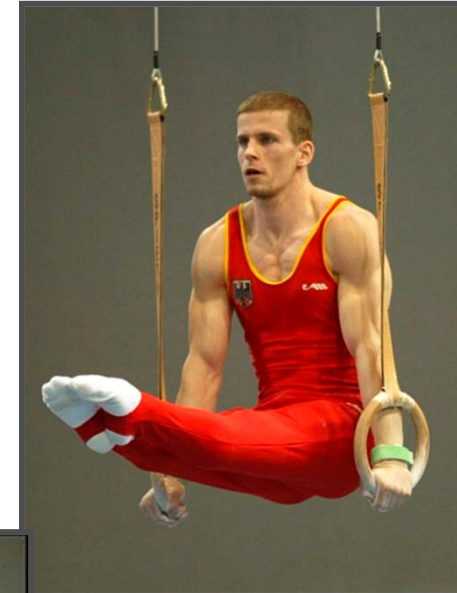
Paraplegia and traumatic brain injury are not yet curable



Spinal Cord Injury (SCI)



Traumatic Brain Injury (TBI)





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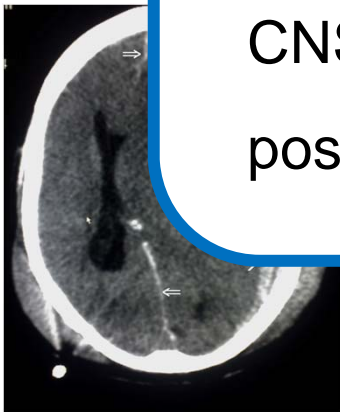
Paraplegia and traumatic brain injury are not yet curable



Spinal Cord Injury



...despite intensive global research on SCI and TBI in the past 35 years – after the seminal findings of the Aguayo lab at McGill University that CNS regeneration after trauma is, in principle, possible.



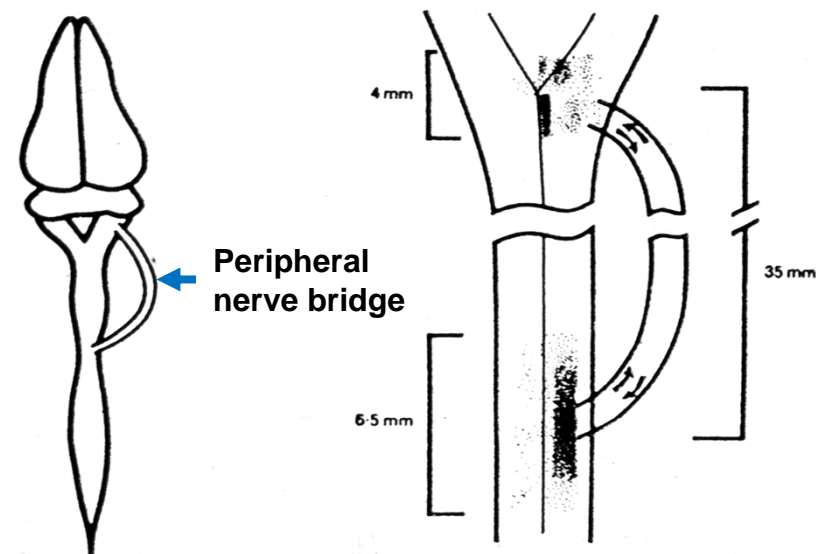
Traumatic Brain Injury (TBI)



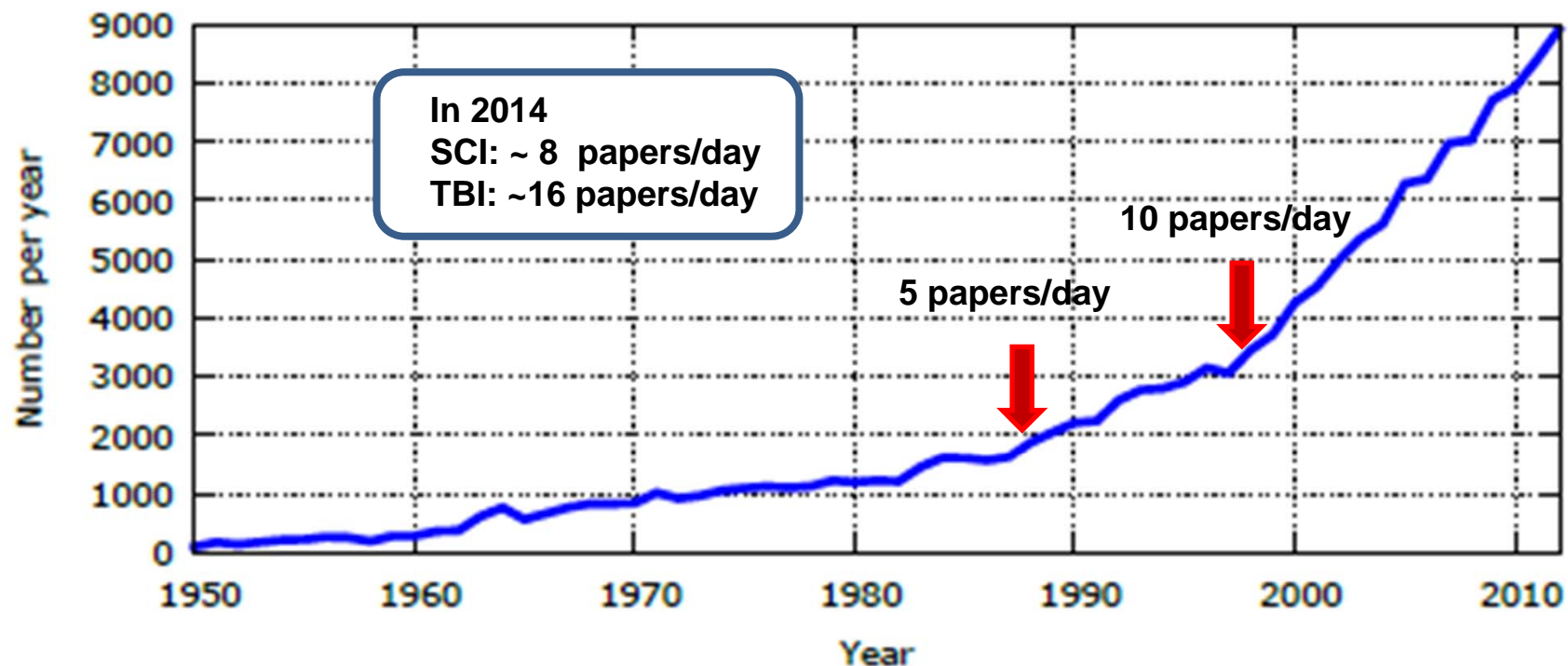
...shows for the first time the potential of the injured CNS to regenerate



David and Aguayo, 1981
Science 214, 931- 933



PubMed Results



PubMed query: „Spinal cord injury“ or „Spinal cord repair“ or „brain injury“ or „brain repair“

Total number of publications: ~150,000 papers (~50.000 SCI; ~100.000 TBI)



PubMed Results



PubMed query: „Spinal cord injury“ or „Spinal cord repair“ or „brain injury“ or „brain repair“

Total number of publications: 151,905 papers (~50.000 SCI; ~100.000 TBI)

- Scientists and clinicians are no longer able to achieve a comprehensive overview of the global progress in their medical field.
- The knowledge that underlies decision-making in selecting the most promising preclinical therapies for further research or clinical trials is notoriously incomplete.
- And, consequently, valuable resources are wasted on numerous fruitless experiments or redundant preclinical studies.

Research



TOP

pharmacology
biochemistry
immunochemistry
cell therapy
Gene technology
microsurgery
rehabilitation etc.

Clinical trials

Translation

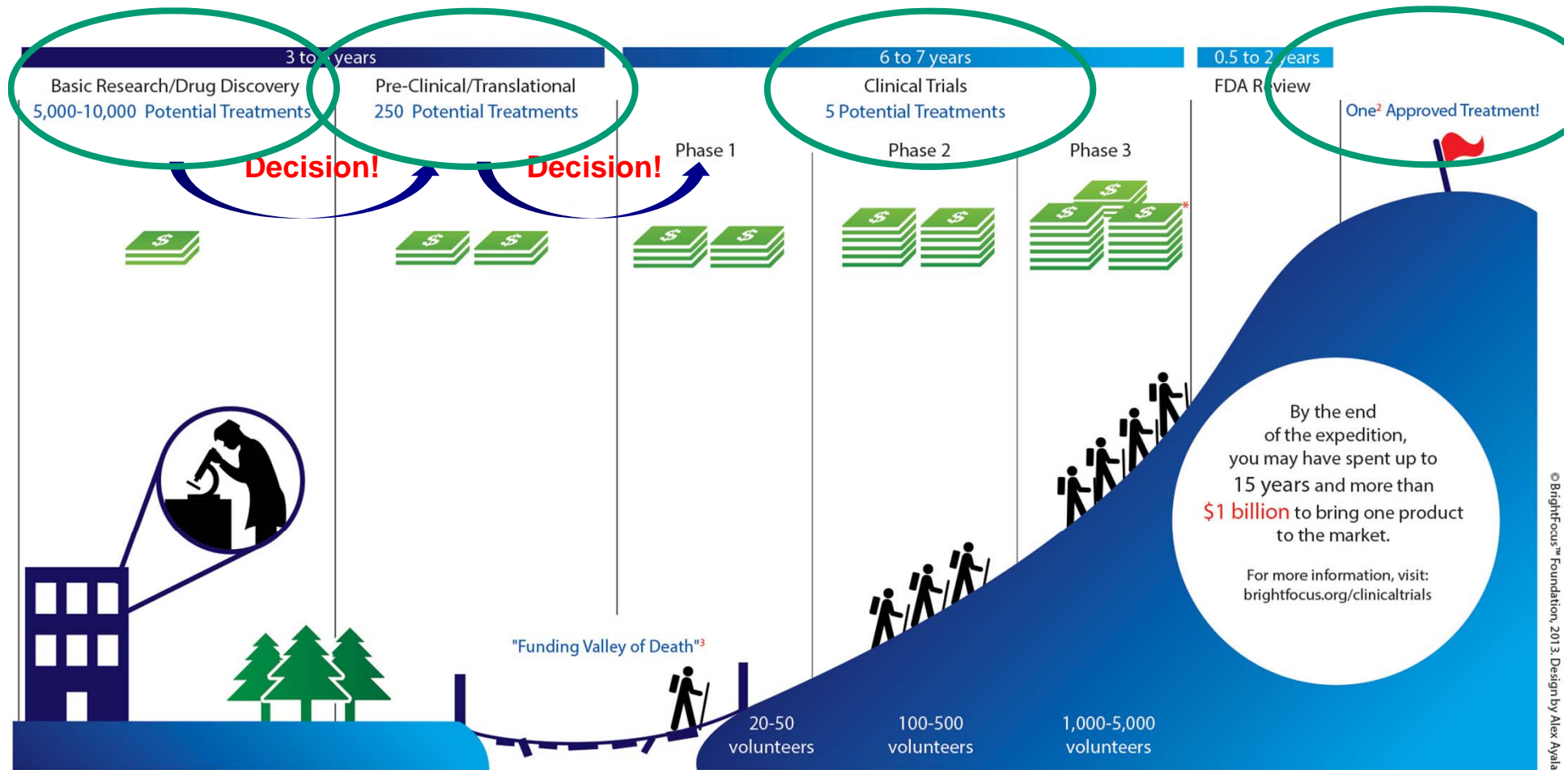


FLOP

Huge number of experimental and preclinical studies on spinal cord regeneration
versus a very small number of resulting innovative (but unsuccessful) clinical trials!

An Uphill Battle

...with crucial decisions and enormous rising costs towards successful translation

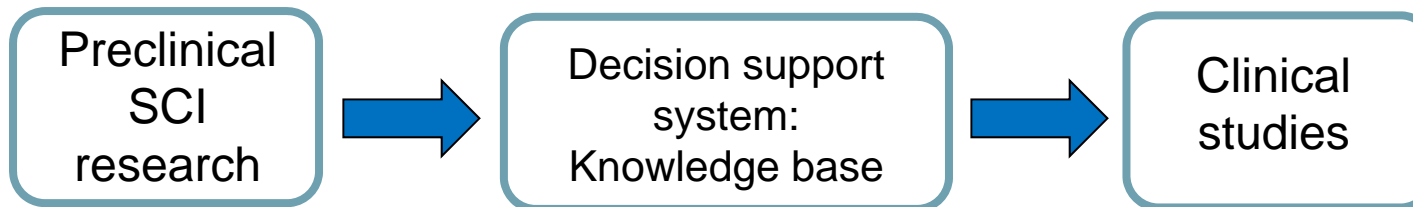




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In urgent need:
Information system to assess the chances of
success for preclinical therapies in translation



Retrieval and management of data from published scientific articles

Evaluation and grading of preclinical treatments according to objective level-of-evidence measures

Generation of hypotheses for novel/optimized therapeutic strategies

Execution of meta-studies to combine results from different approaches to detect relations between experimental conditions and potential weaknesses of a therapy or an experimental model

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- There is an urgent need for a **comprehensive knowledge base** which aggregates the current state of basic and preclinical research in CNS trauma (and other neurological diseases).
 - This would require **automatic information extraction** for big textual data analytics. The information extraction approach should extract the relevant facts about experimental therapies from all relevant peer-reviewed scientific publications currently available.
 - The facts should be collected in a database being capable of aggregating and filtering them in order to allow **objective grading** of the prospective translational success of a particular therapeutic approach.

Acknowledgements



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