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Drug discovery, pharmacognostic approach history

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Introduction:

The word pharmacognosy derives from two ancient Greek words, wμρμακον gnosis pharmakon (drug or poison) and γνωσις gnosis (knowledge). Pharmacognosy studies natural drug derivation. As history teaches, since ancient times, the active principles contained within medicinal herbs cured simple diseases. Pliny the Elder described Papaver Somniferum, poppy, effects in his treatise "Naturalis Historia". In the twentieth book, he used these words: "not only does it sleep, but still catching too much makes you die". In the same book at paragraph 190, he says: "It is also useful that the juice of the decoction prepared by oil for head pains". Similarly, Hippocrates from Kos in the "Corpus Hippocraticum" described willow bark from Salix Alba, like an analgesic and antipyretic remedy. In the same way as Pliny the Elder did, the Greek physician Dioscorides and the Latin physician Galen identified poppy pharmacognostic profile. During middle Ages, the Persian physician Avicenna used opium in the same way. Similarly, describing its use, Paracelsus called the opium extract "Laudan" in 1522. Moreover, the Reverend Edward Stone used in 1757 willow barks, from Salix Alba [Figure 1], like antimalarial. During the history of health, pharmacognostic remedies propose models on drug development and research it's prospective.

Basic methods: Through the centuries, extraction techniques improvement started modern pharmaceutical chemistry. Jonas Anders Bruckner stabilised willow bark extraction in 1828. He prepared Salicin from an aqueous willow bark extract. Later, Felix Hoffmann synthesised aspirin which contains Acetylsalicylic Acids, in 1897.

Figure 1. *Salix alba.*

Morphine discovery emerged by extracting latex from the poppy flower capsule. Its commercial production began in 1827. Hence, leads for drug discovery originated during the late 19th century and throughout the twentieth century. Discovering a druggable target follows different strategies. Therapeutic leads also start by natural origin. The steps to synthesise active principles usecombinatorial techniques as also rational drug design methods.

Methods development:

New molecules design improves Pharmacodynamic profile. Chemical research on morphine gave birth to fentanyl [Figure 2].

Figure 2. *fentanyl*

Chemists enhanced molecule half-life, increasing its effectiveness on prolonged treatment for chronic pain. However, attempts at Morphine modification led to nefarious errors. A pharmaceutical company synthesized and marketed Diacetylmorphine "Heroin" [Figure 3] in 1899.

Figure 3. *Heroin.*

Furthermore, Thalidomide caused a disaster after in vivo positive tests. Its teratogenicity generates many cases of amelia and phocomelia during two decades of distribution on the market.]

Experience and development:

The studies on endogenous mediators like B-endorphins, as those on the Endocannabinoid system, allowed curing Ulcerative Colitis by PEA Palmitoyl-ethanol-amide, an ALIA-mide. Furthermore, complex and non-modifiable structures such as Indolic Alkaloids Vincristine and Vinblastine treat tumours. They derive from Vinca Rosea Catharanthus. The studies on the active principle Artemisinin [Figure 4], derived from Artemisia annua, yielded the Nobel Prize award in 2015, to the Chinese pharmacist Tu Youyou. She has used this herb like antimalarial since 1972.

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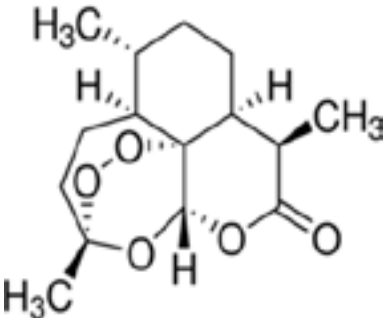

Figure 4. *Artemisinin.*

Certainly, ethnobotany and pharmacognosy lead to active principles discovery. Thus they started modern medicine by pharmacognostic remedies have been handed over the centuries.

Application on drug development:

During the early stages of drug research, tests execute basic screening on molecules. Their aims are:

1. Drug-receptor interaction development

2. Basic drug safety test

3. Sites of action optimisation

4. Molecule efficacy and potency improvement

Molecules development can also start from their natural mediators, as natural molecule and endogenous precursors simulate the interaction on the receptor.

Conclusion:

Pliny the Elder, Hippocrates, Galen, Paracelsus and Avicenna started the development of pharmacognosy. It has shaped the development of modern medicine over the centuries, leaving space for fruitful discoveries. As in the fables of Aesop the fable teaches that (ho mythos deloi oti). What is the moral found through the centuries? Could historical testimonies still lead to new perspectives on the drug discovery field? How could inherited historical examples help to develop modern biotechnological tools? Indeed, part of drug development process derives from reach testimonies left by past research due to herbal medicine practice.

Biography

Doctor Antonio Steardo specialized in Pharmacology and graduated in Pharmacy and Pharmaceutical Chemist. He has now gained years of experience since 2002 in the pharmaceutical products trade sector as he could have been behind the counter of the Steardo pharmacy from an early age. Already in elementary school, the curiosity for chemistry manifests itself during his games and continues lectures at the department of science at the University of Salerno. Therefore during the cycle of studies, he prefers biochemistry and biochemistry of drug action, graduating in July 2007 with a thesis on the functioning of the endocannabinoid system on Alzheimer's disease in pharmacology. Following the beginning of his pharmaceutical chemistry studies, he stopped for a competition as a postgraduate in pharmacology at the University of Rome La Sapienza in July 2014. Expecting constant improvement as a professional update, he enrolled in the continuing professional training department at the University of Oxford to follow courses in experimental and translation therapy and on medical research. His desire to improve leads him to attend international conferences and seminars.

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