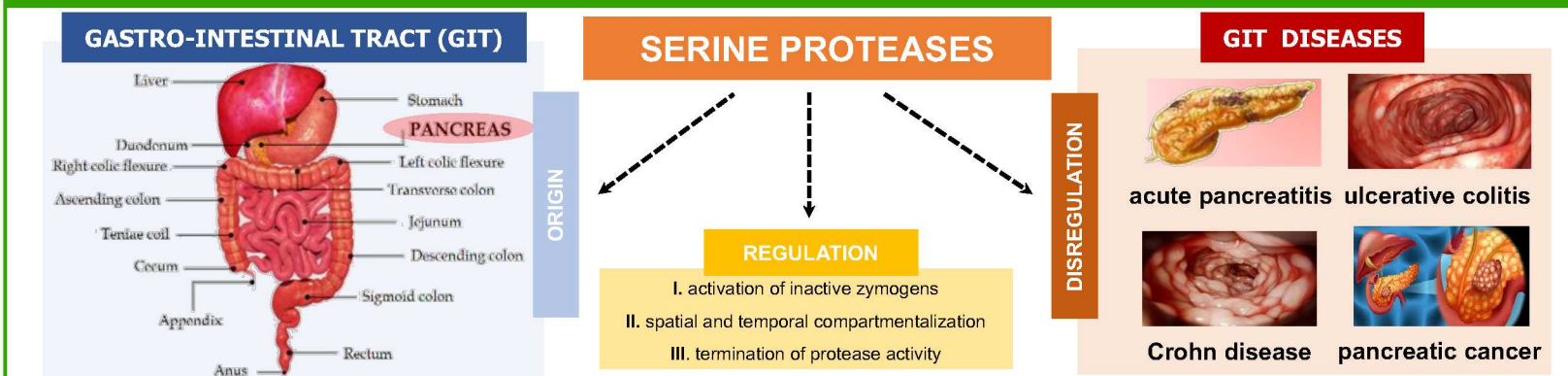
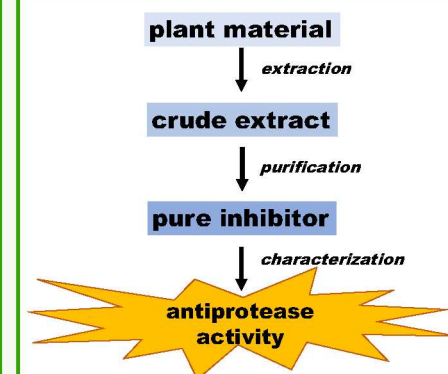


INTRODUCTION



MATERIALS AND METHODS



RESULTS

SERINE PROTEASE INHIBITORS (SPIs)

PROTEIN INHIBITORS

SERPINS

- the biggest and the most widespread group of SPIs
- thermolabile
- serine/cysteine protease

POTATO TYPE

- PI1 and PI2 inhibitors
- the most well-studied plant SPIs
- low molecular weight (8 kDa)
- without disulfide bridges

BOWMAN-BIRK TYPE

- present in legumes and cereals
- low molecular weight (6-20 kDa)
- double-headed inhibitors
- seven conserved disulfide bonds

KUNITZ TYPE

- animal/vegetable origin
- specific for trypsin (18-22 kDa)
- tight complex - slow dissociation
- two disulfide bridges and one reactive site

MUSTARD TYPE

- simple polypeptides (7 kDa) in *Brassicaceae*
- induce tissue disruption
- α -helix with two antiparallel β -sheets

SQUASH TYPE

- especially in plant sources (*Cucurbitaceae*)
- highly stable, rigid proteins (3 kDa)
- inhibition of trypsin/elastase

CEREAL INHIBITORS

- presence in various cereals
- bifunctional inhibitors
- high similarity of secondary structure

NON- PROTEIN INHIBITORS

TERPENES

- non-competitive > competitive inhibitors
- presence and position of hydroxy groups

NITROGEN CONTAINING COMPOUNDS

- number of hydroxyl/ carbonyl groups
- chelation with active site

PHENOLIC COMPOUNDS

- non-competitive > competitive inhibitors
- number and position of hydroxyl and aromatic groups

CONCLUSIONS

Plant material is a rich reservoir of bioactive compounds such as protease inhibitors divided into protein and non-protein compounds/inhibitors.

Protein inhibitors are the primary metabolites produced by the plants in storage organs (seeds, roots). Protease inhibitors bind with target protease by irreversible (suicide inhibitors) or reversible (tight-binding reaction) reaction. The most of protein inhibitors belong to tight-binding inhibitors and they interact with the active site of protease (P1) in the formation of the enzyme-substrate complex.

Non-protein inhibitors are the plant secondary metabolites produced as the response on the external impacts. Non-protein inhibitors can be divided into terpenes, nitrogen-containing compounds, phenolic compounds and sulphur-containing compounds (with non-inhibitory effect on protease activity). Inhibition of serine proteases has most the competitive or non-competitive characters.

The plant serine protease inhibitors can be used in human and veterinary medicine as drugs towards gastrointestinal tract diseases (pancreatitis, Crohn's disease, cancer) and moreover, can be used to control various pests to crops in agriculture.

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