Peptides, similarly to proteins, are composed of amino acids. They are responsible for fundamental physiological activities e.g. majority of hormones and neurotransmitters are peptides. There are also endogenous peptides with antimicrobial and anticancer activities which are important elements of organism's defense system. Due to low-molecular masses, high activity and specificity, low toxicity and practically lack of interactions with drugs, naturally occurring peptides and their synthetic analogues are attractive candidates for drugs. Unfortunately they are unstable in biological systems, therefore their use in medicinal practice is rather limited. Only approx. 60 peptides are used as therapeutic agents Also conventional chemotherapeutics display unfavorable features such as low specificity and bioavailability related to their low solubility. In some cases only small amount of drug reach the target cells. Interestingly, often the favorable and unfavorable pharmaceutical properties of the low molecular weight antimicrobial and anticancer drugs are complementary to the biologically active peptides. The aim of this project is to obtain a new class of potential therapeutics with improved pharmacological profiles as compare with the parent drugs. These compounds are bjoconjugates: peptidic hybrids that molecules containing two different peptides molecules or peptide-based conjugates that composed of peptide and drug molecules (antibiotics). Two classes of peptides will be considered to design bioconjugates. The first are peptides that are able to internalized into the cell. They are known as cell penetrating peptides (CPPs). They should help drug to cross the membrane barrier of target cells. The second one includes peptides with similar biological profiles to the utilized drugs. They should potentiate the drug activity. Both components of bioconjugates will be connected by a chemical moiety named as linker. Two kinds of linkers will be used. Amide bonds are considered as non-degradable in the biological systems. As biodegradable linkers, disulfide bridges will be introduced which are sensitive to reducing agents, and short peptide sequences that are sensitive to lysosomal enzymes. Both degradable linkers should be stable under physiological conditions, and drug molecules should be released in microbial cells. The synthesized conjugates will contain one of the three commonly used antibiotics: nystatin, fluconazole or levofloxacin. The first two are an antifugal agents whereas the third displays a broad spectrum of activity against Gram-positive and Gram-negative bacteria. Antimicrobial peptides used to construct conjugates are: cathelicidins present in mammalian organisms, lactoffericins, lactoferrampin, synthetic antimicrobial peptides (HLopt2, Lfpep) Transportan 10 and analogues of trypsin inhibitor SFTI-1 isolated from sunflower seeds are CPPs considered as peptidic parts of conjugates. All peptidic hybrids will consist with two different antimicrobial peptides. All syntheses will be carried out in the laboratory of PI whereas biological tests will be performed mainly in laboratory of Prof. Tzi Bun Ng from the Chinese University of Hong Kong. The antimicrobial activities will be focused on *Candida* species. These are opportunistic pathogens which may elicit severe infection in immunocompromised patients, contributing significantly to morbidity and mortality. In addition they are becoming resistant to antibiotics used in the medicinal practice. Therefore the is an urgent need for new antimicrobial agents. The most active compounds will be tested *in vivo* using mouse model of disseminated candidiasis and on drug-resistant strains, if available. Selected compounds will be labeled with fluorescence probes to study their distribution inside the target cells. The results obtained will be presented at international and national symposia and published in specialized, international journals. For most promising compounds, action towards commercialization (application in the medicinal practice) will be undertaken. Chemical synthesis of peptide-based bioconjugates is not a routine work and requires specialized knowledge and extensive experience in this field. Several young scientists (Post Docs and PhD students) and MSc students will be involved in this project. This will give them the opportunity to acquire specialized knowledge and skills that are very attractive for both academic centers and pharmaceutical companies.