Abstract

Ceramides, belonging to large family of sphingolipids, play a significant role in many processes in living systems. They participate in both physiological and pathophysiological processes (cell signalization). In addition, they are essential in the human epidermis (*stratum corneum*), where they act as a barrier – they participate in the maintenance of stable internal environment (preventing the penetration of unwanted substances, pathogens and the loss of body water).

Ceramide molecules constist of two basic components. Each molecule contains one of the four sphingo-like bases, and a fatty acid acyl, which is either non-substituted or substituted at the position α- or ω-. All these possible combinations give different types of ceramides that occur in the skin.

This work focuses on ceramides based on 6-hydroxysfingosin – sphingosine base with a hydroxyl group in the 6-position. Ceramides (acylated bases) of this type were found only in the human epidermis, they do not play roles in cell signalization. Therefore, the preparation of this type of ceramides was studied in this work. Another reason to deal with 6-hydroxysfingosine was its unavailability on the market of chemical substances. Thus, the substance for further study was prepared.

Synthesis of 6-hydroxysphingosine: first, commercially available tridecanal reacted with trimethylsilylacetylide and gave (±)-1-trimethylsilylpentadec-1-yn-3-ol. In the next step, an enzymatic reaction with lipase was used. Lipase acetylated only the (*R*)-isomer; thus, it was chromatographically separated from the unreacted *(S)*-alcohol in a single step. Then, the protected groups were deprotected and this chiral propargyl alcohol was silylated on oxygen and then as alkynide reacted with Garner aldehyde. Then, the reduction of triple bond by lithium in ethylamine followed by deprotection was used, to give 6-hydroxysphingosine molecule. The 6-hydroxysphingosine isomers were then acylated by *N*-succinimidylester of lignoceric acid to yield the final ceramide molecule. These ceramides will be further studied with regard to their role in function of the epidermal barrier.