

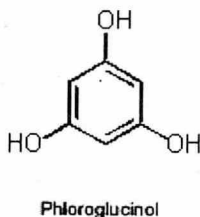
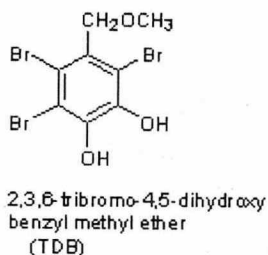
## Bioindustrial Research from Marine Algae

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The effects of bio-active substances extracted from marine algae on regulation of antiaging and induction of apoptosis were researched.

Marine organisms were tested for their  $\cdot O_2^-$  or/and  $ONOO^-$  scavenging activities and reaction mechanisms and investigated for their protection from cell damage by reactive species. 107 different marine organisms were screened for their  $\cdot O_2^-$  or/and  $ONOO^-$  scavenging activities. 2,3,6-tribromo-4,5-dihydroxy benzyl methyl ether (TDB) and phloroglucinol were identified as active ingredients from *Symphyclocladia latiuscula* and *Ecklonia stolonifera*, respectively.



TDB and phloroglucinol were further investigated for their scavenging abilities on  $\cdot O_2^-$  and  $ONOO^-$  as well and for their protection against protein nitration mediated by peroxynitrite. These marine products containing a variety of antioxidants are on development as antioxidative substances.

The cytotoxic effect of 2,3,6-tribromo-dihydroxybenzyl methyl ether extracted from *Symphyclocladia lapuspular* (Red algae) was found to induce apoptosis in which p53, p21, PARP, c-myc and c-jun were involved.

2,3,6-Tribromo-4,5-dihydroxybenzylether (TDB) and 2,3,6-tribromo-4,5-dihydroxybenzyl alcohol (TDB-OH) were isolated and their structures were identified.

The method of total syntheses of these natural products were developed successfully and their new structural analogs were synthesized. The anti-oxidant activity, anti-aging activity and anti-cancer activity of these compounds were assayed by using of NO quantitative analysis, SBR method, Western blot analysis, we found that HS-1580, HS-11581, HS-1582 have cell viability and recovery of cell damage by oxidants.

Phlorohluinol and 2,3,6-tribromo-4,5-dihydroxy benzyl methylether(TDB) showed cytoprotective activity against ONOO<sup>-</sup> in cultured Raw 264.7 cell. The cytotoxicity was determined by SRB method. There results indicate that TDB derivative compounds (1580 series) have strong cytoproective action. TDB derivatives, HS-1580 series showed ONOO<sup>-</sup>scavenging activity and ROS scavenging action.

Developed tablets using of *Ecklonia stolonifera* powder with various formulation were prepared by using the direct compression method. The effect of various ingredients on the hardness and disintegration time was investigated in order to optimize the formulation of the tablets. Since the tablet form of *Ecklonia stolonifera* was feasible, the oral administration would be much convenient and be more accurately controlled.

The results will be used in bettering people's health and developing highly value-added strategic exports by developing new functional foodstuffs, food additives and cosmetics. We developed new cosmetics (named *Ecklonia* Revitalizing Facial Mask Pack) Especially, we synthesized 1622 series from TDB for whitening cosmetics. It is necessary to find out new functional substances having whitening effects from synthetic derivative substances (like 1662 series) and to develop functional cosmetics by synthesizing the substances. Therefore, the results will also serve as a foundation for the enhancement of marine life applications in the bioindustry.