The dPEG® Linker Platform for BioDesign™ of Bioconjugate Therapeutics

Introduction

The term dPEG® stands for "discrete PEG", which is a uniform, single molecular weight (MW), highly pure, next generation polyelthylene glycol polymer. Vector Laboratories manufactures dPEGs using proprietary, patent-protected processes to provide specific MWs, reactive groups, functional moieties, and architectures suited for a wide variety of applications (see Figs 1 & 2). It has been well-established that PEG itself is inert, non-toxic, water soluble, and biocompatible, and when these properties are combined with the above-mentioned features of dPEGs, it provides a powerful tool for the design, optimization, and development of bioconjugate therapeutics.

Explore the dPEG offerings from Vector Laboratories

Array of dPEG based products for research and development —

Numerous synthetic technologies, chemistry expertise and deep familiarity with customer needs have enabled Vector Laboratories to develop a broad portfolio of PEG product lines that are diverse, highly pure, and scalable.

- Homo-, hetero-, and multifunctional crosslinking reagents for conjugating biologics, payloads, carriers, and surfaces.
- A wide variety of reactive groups for conjugation strategies including click chemistry, biorthogonal, site-specific, enzymatic, and stochastic approaches.
- Building blocks & intermediates for flexible linker architecture design.
- Chemical modification reagents with a variety sizes, architectures, and end capping.
- Block copolymers for polymeric and lipid nanoparticles.
- Affinity tags including biotin, lipids, and haptens.
- Fluorophores with increased hydrophilicity.

Figure 1

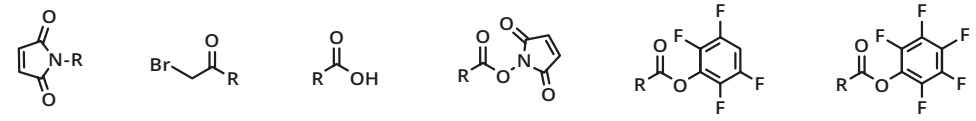

Figure 1

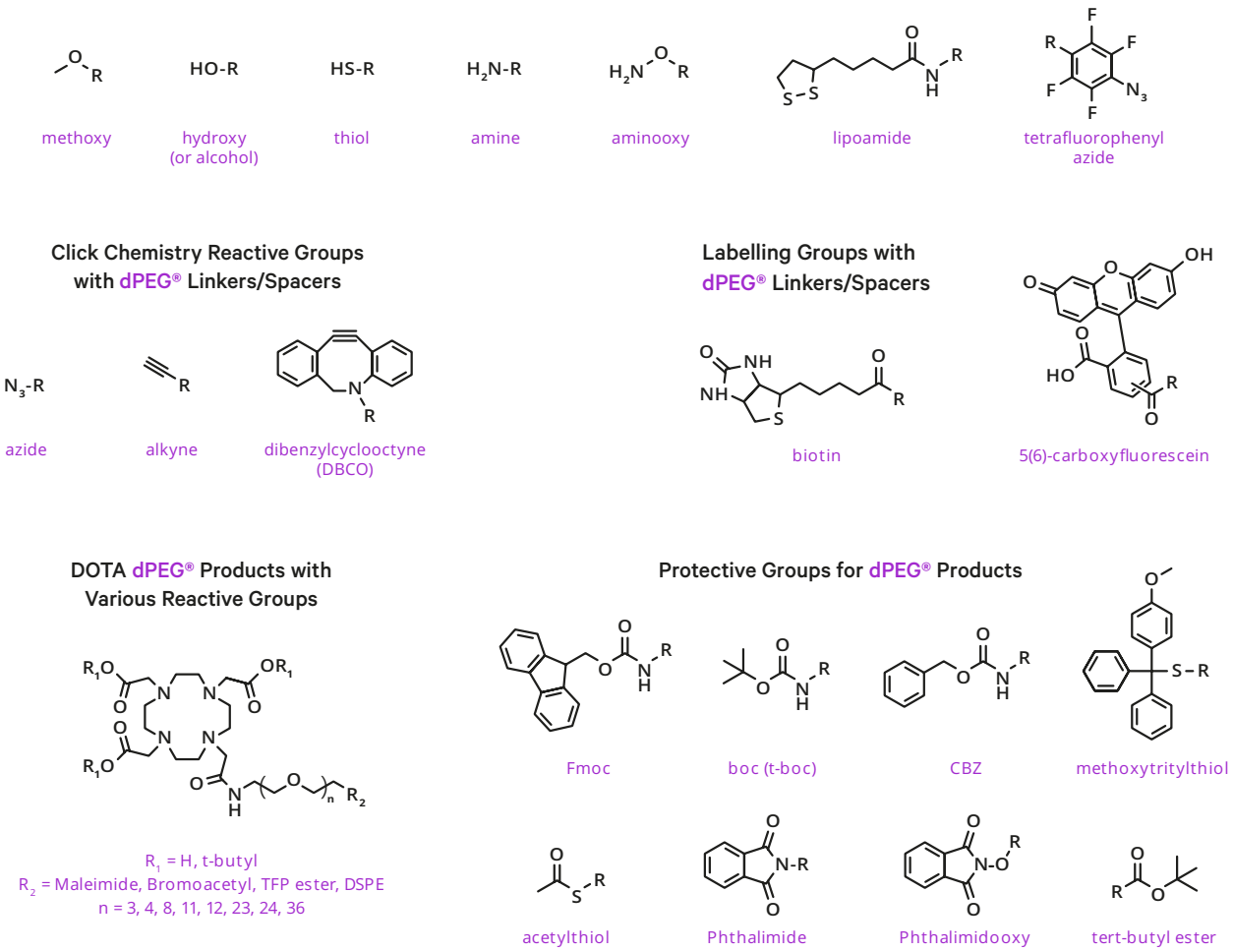

***Figure 1**: Examples of the functional, reactive, labeling, and protective groups on dPEG® products.*

Figure 2

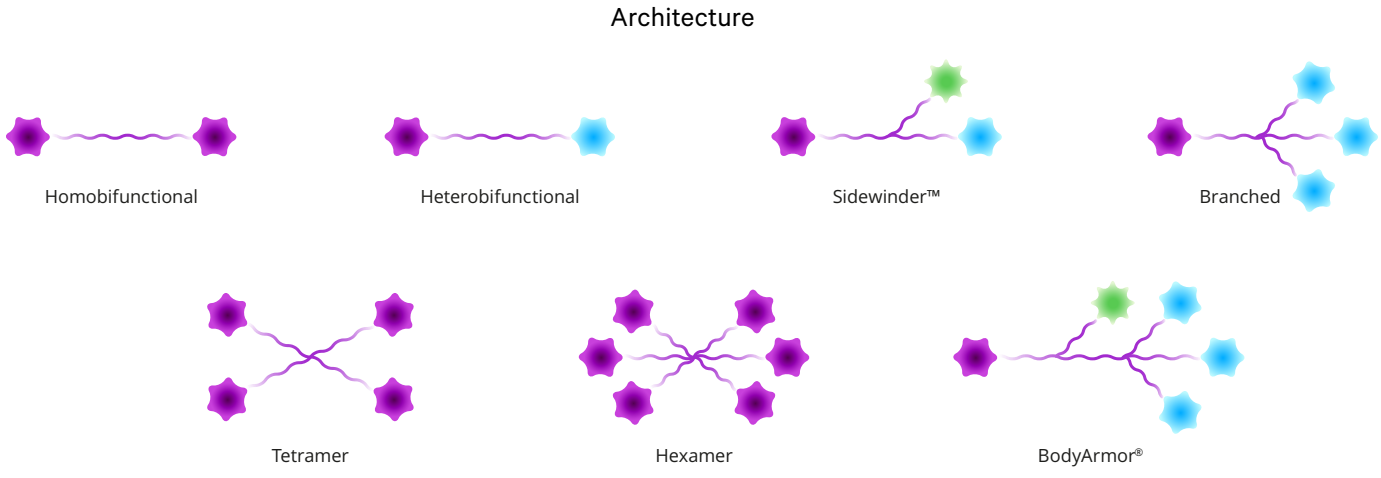

***Figure 2**: Available architectures for dPEG® products. Branched dPEG® products can have three (3) or nine (9) branches. Our Sidewinder™ products are a new class of dPEG® constructs that offer a broad range of new ways to incorporate dPEG® functionality into diagnostic and therapeutic applications. The BodyArmor® product architecture is similar to the Sidewinder, but includes additional orthogonal dPEG® strands.*

Comparison of traditional PEGs with dPEGs

The first clinical applications of large, polydisperse, traditional PEGs in drug development were the PEGylation of proteins, peptides, and enzymes (Oncaspar, Adagen, Peg-Intron, etc.) to improve their drug metabolism and pharmacokinetic (DMPK) properties. This strategy of altering the physiochemical (PC) or DMPK properties by the covalent attachment of PEG is now used for several therapeutic modalities including antibody fragments, peptides, small molecules, oligonucleotides, and nanoparticles.

The dPEGs or uniform PEGs from Vector Laboratories can be used to further optimize the PC and adsorption, distribution, metabolism, elimination, and toxicity (ADMET) properties of a therapeutic, to achieve targeting, solubility and stability requirements. Table 1 shows a few advantages of uniform PEGs over traditional PEGs.

Traditional Polydisperse PEGs	dPEGs
Lower purity with multiple MW entities	Highly pure with a single MW entity (see Fig. 3)
Manufactured by a polymerization process	Manufactured by a proprietary process
Complex to analyze due to multiple entities	Straightforward analysis
Limited design opportunities due to multiple entities	Infinite design possibilities for bioconjugation tools
Limited flexibility of BD, PD and PK property modulation for any bioconjugate constructs	High flexibility for optimization of BD, PD and PK properties in all bioconjugate constructs due to design and manufacture controls

***Table 1**: General differences betwe*

Figure 3

Side-by-side mass spectr ... r Laboratories