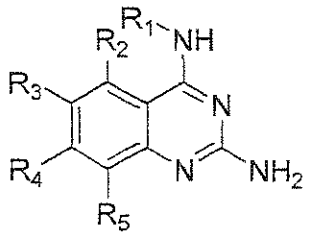
However, there exists a strong need for novel Toll-Like receptor modulators having preferred selectivity, higher potency, higher metabolic stability, and an improved safety profile compared to the compounds of the prior art.

In the treatment of certain viral infections, regular injections of interferon (IFNα) can be administered, as is the case for hepatitis C virus (HCV), (Fried et. al. Peginterferon-alfa plus ribavirin for chronic hepatitis C virus infection, *N Engl J Med* 2002; 347: 975-82). Orally available small molecule IFN inducers offer the potential advantages of reduced immunogenicity and convenience of administration. Thus, novel IFN inducers are potentially effective new class of drugs for treating virus infections. For an example in the literature of a small molecule IFN inducer having antiviral effect see De Clercq, E.; Descamps, J.; De Somer, P. *Science* **1978**, *200*, 563-565.

IFNα is also given in combination with other drugs in the treatment of certain types of cancer (refer to Eur. J. Cancer 46, 2849–57, and Cancer Res. **1992**, *52*, 1056 for examples). TLR 7/8 agonists are also of interest as vaccine adjuvants because of their ability to induce pronounced Th1 response .

In accordance with the present disclosure~~invention~~ a compound of formula (I) is provided



(I)

or a pharmaceutically acceptable salt, solvate or polymorph thereof, wherein

R_1 is C_{3-8}alkyl, C_{3-8}alkoxy, C_{2-6}alkenyl or C_{2-6}alkynyl, each of which is optionally substituted by one or more substituents independently selected from halogen, hydroxyl, amino, nitrile, ester, amide, C_{1-3}alkyl, C_{1-3}alkoxy or C_{3-6}cycloalkyl,

R_2 is hydrogen, halogen, hydroxyl, amine, C_{1-7}alkyl, C_{1-7}alkylamino, C_{1-6}alkoxy, (C_{1-4})alkoxy-(C_{1-4})alkyl, C_{3-6}cycloalkyl, C_{4-7}heterocycle, aromatic, bicyclic heterocycle, arylalkyl, heteroaryl, heteroarylalkyl, carboxylic amide, carboxylic ester each of which is optionally substituted by one or more substituents independently selected from halogen, hydroxyl, amino, C_{1-6}alkyl, di-(C_{1-6})alkyl-amino, C_{1-6}alkylamino, C_{1-6}alkyl, C_{1-6}alkoxy, C_{3-6}cycloalkyl, carboxylic acid,

carboxylic ester, carboxylic amide, heterocycle, aryl, alkenyl, alkynyl, arylalkyl, heteroaryl, heteroarylalkyl, or nitrile,

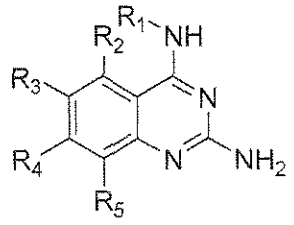
R_3 is hydrogen, halogen, hydroxyl, amine, C_{1-7}alkyl, C_{1-7}alkenyl, C_{1-7}alkynyl, C_{1-7}alkylamino, C_{1-6}alkoxy, (C_{1-4})alkoxy-(C_{1-4})alkyl, C_{3-6}cycloalkyl, C_{4-7}heterocycle, aromatic, bicyclic heterocycle, arylalkyl, heteroaryl, heteroarylalkyl, aryloxy, heteroaryloxy, ketone, nitrile each of which is optionally substituted by one or more substituents independently selected from halogen, hydroxyl, amino, C_{1-6}alkyl, di-(C_{1-6})alkylamino, C_{1-6}alkylamino, C_{1-6}alkyl, C_{1-6}alkoxy, C_{3-6}cycloalkyl, carboxylic acid, carboxylic ester, carboxylic amide, heterocycle, aryl, alkenyl, alkynyl, arylalkyl, heteroaryl, heteroarylalkyl, or nitrile.

R_4 is hydrogen, halogen, hydroxyl, amine, C_{1-7}alkyl, C_{1-7}alkylamino, C_{1-6}alkoxy, (C_{1-4})alkoxy-(C_{1-4})alkyl, C_{3-6}cycloalkyl, C_{4-7}heterocycle, bicyclic heterocycle, arylalkyl, heteroarylalkyl, aryloxy, heteroaryloxy each of which is optionally substituted by one or more substituents independently selected from halogen, hydroxyl, amino, C_{1-6}alkyl, di-(C_{1-6})alkylamino, C_{1-6}alkylamino, C_{1-6}alkyl, C_{1-6}alkoxy, C_{3-6}cycloalkyl, carboxylic acid, carboxylic ester, carboxylic amide, heterocycle, aryl, alkenyl, alkynyl, arylalkyl, heteroaryl, heteroarylalkyl, or nitrile, and

R_5 is hydrogen, fluorine, chlorine or methyl with the proviso that

R_2, R_3, R_4, and R_5 cannot all be H.

In a first aspect, there is provided a compound of formula (I)

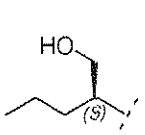


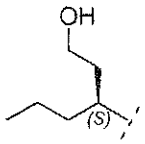
(I)

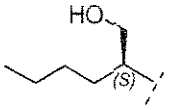
or a pharmaceutically acceptable salt wherein

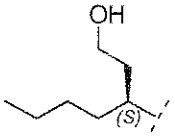
R_1

is one of the following:









R_2 is hydrogen, halogen, hydroxyl, amine, C_{1-7}alkyl, C_{1-7}alkylamino, C_{1-6}alkoxy, or (C_{1-4})alkoxy-(C_{1-4})alkyl,

R_3 is hydrogen, halogen, hydroxyl, amine, C_{1-7}alkyl, C_{1-7}alkenyl, C_{1-7}alkynyl, C_{1-7}alkylamino, C_{1-6}alkoxy or (C_{1-4})alkoxy-(C_{1-4})alkyl,

R_4 is hydrogen, halogen, hydroxyl, amine, C_{1-7}alkyl, C_{1-7}alkylamino, C_{1-6}alkoxy, or (C_{1-4})alkoxy-(C_{1-4})alkyl, and

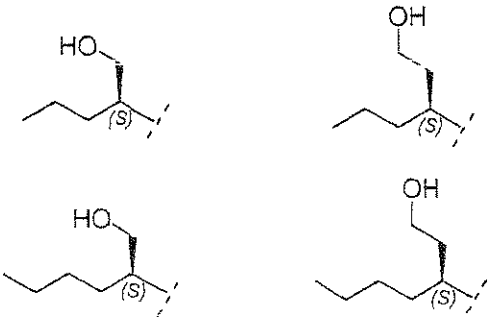
R_5 is hydrogen, fluorine, chlorine or methyl with the proviso that

R_2, R_3, R_4, and R_5 cannot all be H.

In a first embodiment of the present disclosure~~invention~~ provides compounds of formula (I) wherein R_1 is butyl, pentyl or 2-pentyl and wherein R_2, R_3, R_4 and R_5 are as specified above.

In a further embodiment the current disclosure~~invention~~ relates to compounds of formula (I) wherein R_1 is C_{4-8} alkyl substituted with a hydroxyl, and wherein R_2, R_3, R_4 and R_5 are as specified above.

Another embodiment relates to compounds of formula (I) wherein R_1, when being C_{4-8}alkyl substituted with hydroxyl, is one of the following:



In another embodiment the present disclosure~~invention~~ provides compounds of formula (I) wherein R_5 is preferably hydrogen or fluorine and R_1, R_2, R_3, and R_4 are as described above.

The compounds of formula (I) and their pharmaceutically acceptable salt, solvate or polymorph thereof have activity as pharmaceuticals, in particular as modulators of Toll-Like Receptor (especially TLR7 and/or TLR8) activity.

T~~So, in a further aspect t~~he present disclosure~~invention~~ provides a pharmaceutical composition comprising a compound of formula (I) or a pharmaceutically acceptable salt, solvate or polymorph thereof together with one or more pharmaceutically acceptable excipients, diluents or carriers.

In a second aspect, there is provided a pharmaceutical composition comprising a compound as defined above or a pharmaceutically acceptable salt thereof and one or more pharmaceutically acceptable excipients, diluents or carriers.

Furthermore a compound of formula (I) or a pharmaceutically acceptable salt, solvate or polymorph thereof according to the current disclosure~~invention~~, or a pharmaceutical composition comprising said compound of formula (I) or a pharmaceutically acceptable salt, solvate or polymorph thereof can be used as a medicament.

The present disclosure provides~~Another aspect of the invention is that~~ a compound of formula (I) or a pharmaceutically acceptable salt, solvate or polymorph thereof, or said pharmaceutical composition comprising said compound of formula (I) or a pharmaceutically acceptable salt, solvate or polymorph thereof that can be used accordingly in the treatment of a disorder in which the modulation of TLR7 and/or TLR8 is involved.

The term "alkyl" refers to a straight-chain or branched-chain saturated aliphatic hydrocarbon containing the specified number of carbon atoms.

The term "halogen" refers to fluorine, chlorine, bromine or iodine.