

Persistent vegetative state in children: terminology, aetiology, prognosis and ethical issues

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Abstract: The vegetative state comprises a group of clinical features of profound brain damage, which appear to demonstrate that the patient is awake but not aware of internal or external environments. The term was introduced to replace others used in the past, such as prolonged coma or coma vigilie. Children are in a special position because at certain ages there should be consideration not only of their severe disability or handicap but also of their potential to become conscious. Terminology and definitions that are now quite well delineated are described. The boundaries of the vegetative state are noted and its diagnosis and prognosis are discussed in detail. Finally, ethical considerations are discussed, with regard to the different stances taken in different countries. In the Appendix the results of a short survey of members of the Paediatric section of UEMS (European Union of Medical Specialists)/EAP are summarized on the various attitudes and ethical considerations on persistent vegetative state in children.

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Introduction

More than three decades have passed since Professor Bryan Jennett and Professor Fred Plum led the world in understanding the devastating condition of unconsciousness, termed the vegetative state (1). The vegetative state comprises a group of clinical features of profound brain damage that appear to demonstrate that the patient is awake but not aware of internal or external environments. The complexity of its clinical features means that considerable experience is needed to be confident of the diagnosis, and much supportive evidence from a multidisciplinary team experienced in the management of severe brain damage is needed (2). At present neurophysiological assessment and even functional neuroimaging can still play only a supportive rather than a diagnostic or a prognostic role. In spite of concerted attempts to establish clear terminology there is still a relative lack of understanding of the existing nomenclature. Amongst the relatives of brain-damaged persons the term “vegetative” is especially disliked, mainly because of its association with the word “vegetable” (2,3). The term was introduced to replace others used in the past (some of which are still used, although not considered exact), such as prolonged coma or coma vigilie (the patients by definition are not in coma), decerebrate dementia, parasomnia, akinetic mutism and apallic syndrome (still preferred and used by German speaking professionals) (2). Confidence in the

diagnosis can sometimes be questioned due to the existence of similar conditions, such as deafferentated state, locked-in syndrome (also coined by Plum and Posner), and especially the minimally conscious state at one end of the spectrum, with brain death at the other. The prognosis was best represented in the paper by the Multi-Society Task Force, which consisted of adult and paediatric neurologists and neurosurgeons, representing five major medical societies in the US (American Academy of Neurology, Child Neurology Society, American Neurology Association, American Association of Neurological Surgeons and the American Academy of Pediatrics) (4,5). Their tables, especially those on the probability of one-year outcomes, of adults and children respectively, are still generally accepted as a basis for decision-making by both medical and legal professionals (6). Finally, there is a huge bulk of literature on ethical issues, especially on reasons for allowing withdrawal of artificially provided hydration and nutrition (AHN), which is still a debated and controversial topic, with very diverse policies in different European countries (7,8). Children are in a special position because at certain ages there should be consideration not only of their severe disability or handicap but also of their potential to become conscious, particularly in the case of severely damaged newborn or preterm infants (9). The basic statements on decision-making in extreme situations have already been laid down by the Royal

College of Paediatrics (10) and by EAP/the Ethics Working Group (11) (Table 1), which are also used in the recommendations.

This paper is an attempt to deal with the terminological, aetiological, prognostic and ethical issues concerning persistent vegetative state and other borderline conditions of consciousness in children and adolescents.

Terminology and definitions

Consciousness is a spontaneously occurring state of awareness of oneself and one's environment and it has two dimensions, wakefulness and awareness (4,5,12).

Normal consciousness requires arousals, autonomous brain functions that activate mechanisms to induce the wakeful state, while awareness requires wakefulness (but not vice versa) (13). The disorders of consciousness in children include coma and vegetative state, while the term minimally conscious state (MCS) was introduced to better describe those children and adults who are emerging from a vegetative state, and thus represents a condition "of severely altered consciousness in which minimal but definite behavioural evidence of self or environmental awareness is demonstrated" (12). The diagnostic criteria include simple command following, gestural responses, intelligible verbalization and purposeful behaviour (appropriate smile/cry, vocalization, reaching for objects, touching/holding objects and pursuit eye movements) (14). The term vegetative state can be described as a condition of complete unawareness of the self and the environment, accompanied by preserved sleep-wake cycles with either complete or partial preservation of hypothalamic and brain stem autonomic functions (4,5). The multi-society task force also expressed the view that persistent vegetative state (PVS) was a diagnosis,

while permanent vegetative state was a prognosis. The word persistent usually describes those children and adults who are vegetative for more than one, three or 12 months, according to the aetiology, while permanent describes those who remain vegetative for more than 12 months after traumatic brain injury or more than 3 months after non-traumatic (e.g. anoxic-ischaemic) brain injury. However, it is now generally agreed that it is preferable to describe the duration and aetiology of the vegetative state rather than to use the terms persistent/permanent (12). The definition of PVS in infants and children includes 10 clinical characteristics that are generally accepted as constituting an operational definition (Table 3). The term coma describes a state of deep, unarousable sustained pathologic unconsciousness with the eyes closed that results from dysfunction of the ascending reticular activating system either in the brainstem or in both cerebral hemispheres (12). Coma usually requires the period of unconsciousness to persist for at least one hour - to distinguish it from other states of transient unconsciousness. Patients in coma lack wakefulness and awareness (patients in vegetative state lack awareness but have retained wakefulness) while the depth of coma can be specified by assessment of brainstem reflexes, breathing pattern, change of pulse and/or respiratory rate to stimulation and stimulus induced non-specific movement (12,15). In comparison, brain death is a permanent absence of all brain functions, including those of the brain stem, and the guidelines for its diagnosis in infants and children are now well established (15). Finally, there are some conditions which should be clearly differentiated from those cited above. Newborn infants cannot be regarded as being in PVS. Even full-term, healthy newborn babies fulfill only five of nine psychological criteria for being conscious. They have perception, record sensory stimulation, can be

Table 1. Considerations on the decision to withhold or withdraw life-supporting treatment in extreme situations (11)

1. Circumstances where life and/or life-supporting treatment are judged as unbearable for the child without the prospect of recovery.
2. One must honestly try to find out the best interest of children.
3. Actual or potential physical or mental disability itself is not a reason to withhold or withdraw life-sustaining treatment.
4. All remedial causes for the child's condition should be excluded.
5. Available evidence for diagnosis, prognosis and alternative therapy should have been thoroughly explored and discussed.
6. Serious doubts in regarding what is in the best interest of the child should favour supporting the life of the child.
7. Each decision must be made in partnership with the competent child (not relevant in persistent vegetative states), the parents/guardians, the family and the entire health care team.
8. Withholding or withdrawal of life-supporting measures must be coupled with maximal palliative care, including prevention of suffering from hunger, thirst or pain, considering cultural sensitive social and psychosocial support and reflecting religious belief.
9. Paediatricians reject intentional ending of life by administration of a lethal dosage of medication. Treatment to relieve suffering that may shorten life as a side-effect is acceptable where the intention of medication is not to end the life of the child.
10. During and after the death bereavement and consulting support should be ensured.

awakened, show emotions and interact socially. However, they have limited long-term memory and cannot speak, and they lack symbolic thinking and free will (9,16).

Aetiological problems and boundaries of persistent vegetative state in children

Some of the major neurological conditions that every clinician must be aware of and be able to differentiate from a vegetative state are listed in Table 2. The majority of members of the American Child Neurology Society agreed that the most appropriate statement on childhood PVS is that it “can be diagnosed based on the appropriate clinical neurological examination for age, knowledge of the insult causing brain injury, and appropriate period of observation depending on the age of the patient and nature of the insult” (17). The majority (70%) of child neurologists questioned believed that a diagnosis of PVS could reliably be made in children above two years of age, while before this age, especially below the age of two months, the diagnosis was thought by 16% of child neurologists to be feasible. Some practical and easy approaches can be used to better present the interconnections of different conditions and the boundaries of PVS (Table 4) (15).

Diagnosis and prognosis of PVS

New polysomnographic techniques, which allow long-term monitoring and even ambulatory recordings in infants and small children, can contribute to the differentiation of sleep/wake stages and thus to assessing some of the higher cortical functions. Regarding the outcome it seems that somatosensory evoked responses are the most sensitive and reliable (15). Classical electroencephalography (EEG) may be supportive of the diagnosis but cannot be diagnostic per se and is still

far from being prognostic (2). New visual functional techniques and especially some of the techniques for cognitive functional assessment in infants and newborns (e.g. visual evoked potentials and cognitive evoked potentials) will in the future permit better understanding and will define the possibility of the infant for sudden focusing and even tracking of objects when possible emergence from the vegetative state is under question. However, the problem remains that there are no tests that can confirm whether the child has any “internal awareness” and whether there exist any abilities to react with others or have any meaningful response to the spoken word. Serial investigations of brain metabolic activity (e.g. measured by positron emission tomography - PET) may potentially be of great value in providing objective criteria confirming the clinical diagnosis of PVS, particularly in small children. However, the restricted availability of this technology, recent statements on the diagnosis of the vegetative state without the need for any radiological or laboratory investigations and the limitations of its interpretation in young children due to low rates of brain metabolic activity and blood flow, all limit its value as a practical diagnostic and/or prognostic tool (6,15). A study made 25 years ago showed very poor outcomes for children in vegetative state following coma as there were only 10 survivors (out of 17 in the series) and only one child became ambulant a year after the initial insult and was moderately mentally retarded (18). The same study also confirmed the notion that children who develop the vegetative state following coma have a poor prognosis, especially when there are early indicators such as decorticate or decerebrate responses, roving eye-movements and spontaneous blinking. More recent studies have shown that the survival rate of PVS children appears to be directly related to age, as the younger children,

Table 2. Definitions of persistent vegetative state in infants and children*

| | Apply (%) | Supportive (%) | Necessary (%) |
|---|-----------|----------------|---------------|
| 1. Wakefulness without awareness | 95 | 16 | 84 |
| 2. Eyes-open unconsciousness | 94 | 33 | 67 |
| 3. No “voluntary” action/behaviour | 91 | 23 | 77 |
| 4. No “cognitive” response | 90 | 22 | 78 |
| 5. No “voluntary” language | 84 | 29 | 71 |
| 6. Inability to follow commands | 83 | 22 | 78 |
| 7. Spontaneous eye movements but no sustained tracking | 83 | 47 | 53 |
| 8. Intact brainstem reflexes and sleep/wake cycles | 75 | 53 | 47 |
| 9. Spontaneous breathing, chewing and swallowing impaired | 75 | 65 | 35 |
| 10. Bowel and bladder incontinence | 53 | 53 | 47 |

*Opinion of 250 Child Neurologists (members of American Child Neurology Society) in a study by Ashwal et al (ref. 17) as to which of the listed criteria would apply, be supportive or be necessary as a clinical characteristic for the constitution of the operational guideline of persistent vegetative state (PVS). The data reflect the general opinion that PVS in infants and children is defined as a loss of higher cortical functions rather than the existence of vegetative functions.

Table 3. Severe disturbances of consciousness and related conditions (adapted from 3,4,5)

| Condition | Self awareness | Pain & suffering | Sleep/wake cycling | Motor function | Respiratory function | EEG | Outcome/recovery |
|---------------------------|--------------------------|------------------|--------------------|--|------------------------------|---|---|
| Brain death | Absent | No | Absent | None; Spinal reflexes possible | Absent | No cerebral electrical activity/silence | No recovery |
| Coma | Absent | No | Absent | No purposeful movements | Variably depressed | Polymorphic delat/theta | Evolves to recovery, PVS or death in 2-4 weeks |
| PVS | Absent | No | Intact | No purposeful movements | Normal/mildly depressed | Polymorphic theta/delta | Depends on aetiology (acute traumatic/non-traumatic; degenerative/metabolic; developmental/chromosomal) |
| Minimally conscious state | Present but very limited | Yes | Intact | Some purposeful movements | Normal/mildly depressed | Polymorphic theta/delta | Recovery unknown, probably depends on aetiology (see above) |
| Akinetic mutism | Limited | Yes | Intact | Moderate limitation of movements | Normal/mildly depressed | Slow | Recovery unlikely or limited |
| Locked-in-syndrome | Present | Yes | Intact | Tetraplegia; pseudobulbar palsy; eye movements preserved | Normal to variably depressed | Normal | Recovery unlikely; remain tetraplegic |

EEG=electroencephalogram, PVS=persistent vegetative state

especially those below two months of age, tended to have much shorter survival than children above seven years (mean duration of survival 4.1 vs. 7.4 years respectively) (17). Regarding the aetiology, the longer duration of survival was found in the non-traumatic group of PVS children compared to the traumatic group (8.6 vs. 3.0 years respectively) and perinatal injuries are associated with much shorter survival than those due to developmental/chromosomal abnormalities (4.1 vs. 8.2 years respectively) (19). These findings suggest the possibility that relative sparing of brainstem and hypothalamic functions in the latter group in contrast to the perinatal-insult group (where these structures may be seriously injured) is essential for survival. More recent data suggest that the one-year outcome is much better after a one month follow-up, compared with a follow-up of three and six months respectively (Table 5) (4-6). Some authorities believe that the estimates of long-term survival by the Task Force Report are too low and that many reported deaths could be the result of decisions to limit life-sustaining measures. There might be a difference between how long these patients could live and how long they do live, as the practice of limiting life-sustaining medical treatment once the vegetative state is declared permanent becomes more widely accepted

(6,7). Finally, a recent paper by Ashwal (15) reports the following probabilities for recovery:

1. After 3 months, children in post-traumatic VS have a 56% chance of regaining consciousness, in contrast to only 3% of children with non-traumatic VS. Good or moderate recovery is expected in 32% of children.
2. After 6 months, children in post-traumatic VS have a 31% chance of recovering consciousness, in contrast to only 3% of children with non-traumatic VS. Good or moderate recovery can be expected in only 11%.
3. VS can thus be considered permanent 12 months after brain trauma or 3 months after non-traumatic brain injury in children. The chance of recovery after this period seems to be exceedingly rare (however, cases of good recovery are well documented even after 12 months of PVS) and is almost always associated with severe disability.

Ethical issues and decisions on withdrawal of artificially provided hydration and nutrition (AHN)

When Chalmers wrote on the phenomenology of the conscious mind, he noted: "...when I close my

Table 4. Stepwise approach in evaluation of the unconscious child as proposed by S. Ashwal (adapted from 11, 14)

| Is the patient conscious? | | | |
|---|---|---|--|
| Evidence of sustained or reproducible purposeful response or external stimuli | | | |
| NO | | YES | |
| absent brainstem function and apnoea | | preserved functional interactive communication and/or functional use of one or more objects | |
| YES | NO | NO* | YES |
| BRAIN DEATH | preserved sleep/wake cycle and eye opening to stimulus or spontaneously | MINIMALLY CONSCIOUS STATE | vertical eye movements present and/or eye blinking |
| | NO | | YES |
| | COMA | | LOCKED-IN SYNDROME |
| | YES | | NO |
| | VEGETATIVE STATE | | EMERGENCE FROM MCS† |

* usually preserved: following simple commands and/or gestural or yes/no responses and/or intelligible verbalization and/or purposeful behaviours in response to environmental stimuli (not reflex activity) BUT not able to express preferences

† patient has emerged from minimally conscious state (MCS) and may have: mild to severe disability or may become normal

eyes, the whole world disappears and when I open them again, the world appears again” and this is a simplified description of the assessment of consciousness (see Table 3). As Searle stated: “consciousness consists of inner, qualitative, subjective states and processes of sentience or awareness. Consciousness begins when we wake in the morning and continues until we fall asleep again, die, go into coma, or otherwise become ‘unconscious’” (16). However, things become further complicated when other philosophical aspects of consciousness are taken into account, and perhaps its most frequently discussed role involves awareness of the sensory world as well as the awareness of self (including feelings and thoughts) and voluntary control involved in self-regulation (20,21). When the medical professionals and the parents have finally become convinced that the child has reached a (permanent) vegetative state condition, the question of final outcome becomes important, while the ethical decisions should depend on the most reliable prognosis. It is rather impractical to separate discussion of the ethical and legal issues raised by decisions to limit life-prolonging measures for vegetative patients, as the law is largely concerned with ethical principles in particular situations, and doctors and ethicists seek the formal approval of the public or society (represented by the judiciary) for their decisions to limit or stop artificially provided hydration and nutrition (AHN) (22).

The appendix presents the variations regarding attitudes about PVS in children in different EU countries according to the results of a short survey on these issues among CESP/EAP members.

Despite the fact that there are guidelines to help physicians decide whether certain actions would be

ethical or not, they must also confront the obstacles of personal values, as well as professional, religious and cultural factors. The decision about withdrawing

Table 5. The Multi-Society Task Force data (4,5) - conclusions about long-term prognosis are based on review of 754 cases published in the English language literature who were vegetative at one month after an acute insult and from whom one-year outcome was available. The present table includes only children with PVS (Total: 151, with traumatic injury: 106). The age limit was not defined but most were probably under the age of 16 years

One-year outcome of those in vegetative state at 1, 3 and 6 months respectively

a) Vegetative state - children after head trauma (n = 106).

All figures in %.

| Outcome | At 1 month | At 3 months | At 6 months |
|---------------|------------|-------------|-------------|
| died | 9 | 14 | 14 |
| vegetative | 29 | 30 | 54 |
| conscious | 62 | 56 | 32 |
| (independent) | (27) | (32) | (11) |

b) Vegetative state - children with non-traumatic causes (n = 45). All figures in %.

| Outcome | At 1 month | At 3 months | At 6 months |
|---------------|------------|-------------|-------------|
| died | 22 | 3 | 0 |
| vegetative | 65 | 94 | 97 |
| conscious | 13 | 3 | 3 |
| (independent) | (6) | (0) | (0) |

Children did much better than adults (one-year outcome of those adults in vegetative state at one month: died after trauma 33% and dead due to non-traumatic causes 53%). Also one-year outcome of children in vegetative state at one month revealed that 62%/13% regained consciousness in comparison to adults where these percentages were 52%/15% respectively. The highest independence rate was achieved in head injured children (27%), the lowest in nontraumatic adults (4%) (6).

AHN and other life-sustaining medical treatment is still associated with a great deal of controversy, especially in paediatric practice. Even when the team in the intensive care unit and the members of the family all agree that it is the right thing to do, there is still sufficient negative professional and public sentiment to make it worth pursuing a judicial order to support such an act (7). Finally, a list is provided of some of the recent examples of practical decision-making and conclusions about treatment regimes in severely ill patients, and especially of the decisions when to withhold or withdraw life-sustaining treatment in children. Recently the Ethics Task Force argued that the word "passive euthanasia" should not be used for withdrawing or withholding life-prolonging treatment that is not providing a benefit to the patient (23) (see also the arguments in the RCPCH document quoted above). However, there are also some rebuttals to this argument, as some believe that professionals should be allowed to employ this term in their discussions of policy and clinical practice (24). Regarding the challenges in end-of-life care in the intensive care units, the recommendation is that the patient must be assured a pain-free death. The patient must be given sufficient analgesia to alleviate pain and distress; if such analgesia hastens death, this "double-effect" should not detract from the primary aim of ensuring comfort (25). Some practical instructions on decision-making about withdrawal of life-sustaining treatment in children are given by Alderson and Nicholson (26). They suggest that the decisions should not be rushed, and should be based on all the evidence available. There should be frequent sharing of information and discussions between all the members of the team, and regular informing and listening to the family, taking into account the child's interests. Treatment should be withdrawn in a certain sequence (for example, first withdrawal of experimental interventions, then withdrawal of mechanical ventilation, withdrawal of inotropic pressor agents, forgoing antibiotics, forgoing artificial nutrition, including nasogastric tube feeding and decrease of intravenous fluids. Apart from these actions, the physician has a duty to comfort and cherish the child, to prevent and relieve suffering (pain) and to inform and support the family. Once an end-of-life decision has been made, the primary aim is to relieve suffering; pain relief is essential even if it hastens death (allowing the principle of the double effect - that is, associated repression of respiration, if it relieves suffering, is acceptable). If a ventilator is to be switched off, the time should be decided in agreement with the parents and with careful preparation and support. The use of paralyzing agents

should be carefully reconsidered. The care should also continue after the child's death (10,26). Finally, some advice has been addressed to the family physicians, who are frequently in a position to integrate medical knowledge, individual values and cultural influences into end-of-life care, especially after the Patient Self-Determination Act was written in response to the Cruzan case (27). This implementation is particularly useful in those cases where a self-decision to end one's life has been expressed.

Conclusions

Thirty years after the term "persistent vegetative state" was first coined by Jennett and Plum it remains the most commonly used term, despite many arguments (more or less substantial) that it should be changed. In addition to the term vegetative state, many authors would like to include aetiological cause and duration. The majority of child neurologists believe that wakefulness without awareness, unconsciousness with the eyes wide open, and absence of voluntary behaviour and language along with lack of cognitive response, are the landmarks of the definition of PVS in children (17). However, such a definition is difficult to be applied in those children who (due to immaturity or disease condition) already demonstrated some of these characteristics before appearance of PVS (9,16).

Concerning the aetiological borders, there are not too many problems regarding the distinction of PVS from other similar conditions (refer to Tables 2 and 3), although again in the young age-group they may be questionable and difficult to determine.

The Multi-Society Task Force on PVS presented data which gave approximate figures of the long-term (6 and 12 months respectively) outcome of those children who had been at least one month in PVS, due to either traumatic or non-traumatic causes (4,5). The common notion is that children in VS with traumatic brain injury have the best prognosis, as more than half will recover and another half of these will have at least a fair or even a good recovery (4,5,16).

Finally but definitely, the most important are the ethical issues related to PVS. The ethics of PVS management rests on some (un)resolved court cases in the recent past. Good clinical practice (28,30) requires a multidisciplinary team (consisting of at least a paediatric intensive care specialist, a child neurologist, a senior registered nurse working in paediatric intensive care unit and a child psychologist) who should first reach an absolute consensus between the members of the team. Thereafter, the team is allowed to sit down with the parents and other relatives to discuss with

them the possibility of withdrawal of AHN in a child who is in PVS. However, there is still an ongoing debate with pro-life representatives about whether such an act is ever justified (“killing or letting die” (6)), regardless of the wishes of the parents. However, some authorities (see an excellent paper on a personal experience by Dr. Richard J. Lin (7)) recommend that: “even if the health-care team and the family of the patient feel it is the ‘right’ thing to do, there is still enough negative professional and public sentiment that it may be worthwhile for a family wishing to withdraw AHN for a loved one to pursue a judicial order supporting their wishes” (7).

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Appendix

A questionnaire (A) was sent to each of the 35 members and to the observer national delegates to the Paediatric Section of UEMS/European Academy of Paediatrics (formerly CESP). Replies were received from 22 countries and the results are tabulated (B).

A. Questionnaire: Bioethics Committees in Europe and dealing with persistent vegetative state (PVS) in children.

| | | |
|---|-----|----|
| 1. Is there a National Bioethics Committee in your country? | yes | no |
| 2. Are the interests of children always represented? | yes | no |
| 3. Does your National Paediatric Society have an Ethics Committee ? | yes | no |
| 4. Are there special guidelines on ethics in paediatric practice ? | yes | no |
| 5. Do local hospitals and universities have ethics committees? | yes | no |
| 6. Do you have a strict definition of PVS? If yes, please answer the following: | yes | no |
| 6a. Do you use the definition below? | yes | no |
| 7. Do you encounter the cases of PVS? | yes | no |
| 8. Would you ever consider withdrawal of artificially provided hydration and nutrition (AHN) in PVS children? If yes, please answer the following: | yes | no |
| 8a. Would you still consider that it may be worthwhile to pursue a judicial order to support such an act? | yes | no |
| 9. PVS patients do not require any technological support in order to maintain their vital functions and such patients cannot in any way be considered terminal patients, since their condition can be stable and enduring. | yes | no |
| 10. Do you think that the word "passive euthanasia" should not be used for the withdrawing or withholding of life-prolonging treatment which is not providing a benefit to the patient ? | yes | no |

**B. The tabulated results from the delegates of 22 countries within the Paediatric Section of UEMS/EAP (formerly CESP).
Y = yes; N= no; / = no answer**

| Country | National committee of children | Interests of children | National Paediatric EC | Ethical guidelines - paediatric | University EC | Strict definition PVS | Common | Cases of PVS | With drawal AHN | Judicial order | PVS not terminal | Passive euthanasia should not be used |
|--|--------------------------------|-----------------------|------------------------|---------------------------------|---------------|-----------------------|--------|--------------|-----------------|----------------|------------------|---------------------------------------|
| Austria | Y | N | Y | Y | Y | N | Y | Y | N | / | Y | Y |
| Belgium | Y | N | N | N | Y | Y | Y | Y | N | N | Y | Y |
| Czech Republic | Y | Y | N | N | Y | N | / | Y | N | N | Y | Y |
| Denmark | Y | Y | N | Y | N | Y | Y | Y | Y | N | Y | Y |
| Former Yugoslav Republic of Macedonia | Y | Y | N | N | Y | Y | Y | N | N | N | N | Y |
| France | Y | Y | N | N | Y | Y | Y | Y | N | N | Y | Y |
| Georgia | Y | Y | Y | Y | Y | Y | Y | N | Y | Y | N | Y |
| Germany | Y | N | Y | Y | Y | Y | Y | N | Y | Y | Y | Y |
| Greece | Y | Y | Y | N | Y | Y | Y | N | N | / | / | Y |
| Hungary | Y | Y | Y | N | Y | Y | Y | N | N | Y | Y | Y |
| Ireland | Y | Y | N | N | Y | N | Y | Y | N | N | Y | Y |
| Israel | Y | Y | N | Y | Y | Y | Y | Y | Y | N | Y | Y |
| Italy | Y | Y | N | Y | Y | Y | Y | N | N | N | Y | Y |
| Luxembourg | Y | N | N | N | Y | Y | Y | Y | N | N | Y | Y |
| Netherlands | Y | Y | Y | Y | Y | N | Y | Y | N | N | Y | Y |
| Norway | Y | Y | N | N | Y | Y | Y | Y | Y | N | N | N |
| Slovakia | Y | Y | Y | Y | Y | Y | Y | N | N | / | Y | N |
| Slovenia | Y | Y | N | N | Y | Y | Y | Y | Y | Y | Y | Y |
| Sweden | Y | Y | Y | N | Y | N | / | N | N | N | Y | N |
| Switzerland | Y | Y | N | Y | Y | Y | Y | Y | N | N | Y | Y |
| Turkey | Y | Y | Y | N | Y | Y | Y | Y | N | / | Y | Y |
| United Kingdom of Great Britain and Northern Ireland | N | N | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |