Helicobacter pylori — screening prospect

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Screening prospect means that infection by Heliobacter Pylori is a problem is so frequent, so severe and so costly, that it becomes interesting to take it into account as a health care issue.

A. Is HP infection a health care issue ?

Helicobacter pylori (*HP*) is an ubiquitous bacteria, infecting the stomach of half the world's population (1). "*Based on mortality associated to the risk of bleeding ulcers or of cancer, this infection is unequivocally a health care issue*". This is one of the concepts admitted during the Maastricht Consensus 1996 (2). The World Health Organisation has classified *HP* as a grade I (definite) carcinogen (3), in our countries, gastric cancer ranks fourth representing 8.5% of all cancers. In an individual patient/doctor relationship, all diagnosed *HP* infection will involve its treatment, or more precisely its eradication, with a will of improvement of patient's compliance. But the global management of a risk needs an appreciation of the balance between the frequency and the severity of a problem. In terms of total management of *HP* pathologies, currently, we must appreciate the cost/benefit of interventions on each step of the management of the infection.

— Preclinically, a better knowledge of the transmission of *HP* infection and of the national prevalence, incidence and risk of reinfection can give raise to a better policy of prevention. This is a political issue with economical, legal and educational implications.
— Clinically, we know the implication of *HP* in the main gastric diseases as chronic gastritis : 90%, duodenal ulcers (95%) (4), gastric ulcers (near 100% in the absence of AINS) (4), MALT lymphoma (up to 95%) and gastric malignancies could be attributed to *HP* in 43 to 78%.

Any kind of screening is not an isolated decision, it will involve a cascade of other effective actions to be assumed by the community.

B. Is screening for HP infection advisable ?

To discuss the strategy of a screening for HP infection, we need to appreciate some points (table I).

Table I. — **Screening strategy for H. Pylori infection**

a. The risks

1) *Frequency* of the infection
of its consequences.
2) *Natural evolution* of the infection
of its complications
3) *Severity* of its consequences in terms of individual risk
of burden for the society.

b. The tools

1) *Screening* : efficacy and cost of the techniques used
2) *Treatment* : efficacy, dangers, duration of the protection obtained and cost of the treatment.
3) *Durability* : need of a follow up to test eradication, reinfection
4) *Alternatives* : — Better control of environmental factors influencing contamination rate on risk of more severe morbidity
— Vaccinal policy.

c. The targets

Depending on the health care policy and the therapeutic tools used, screening could be selective or wide.
If selective, following characteristics of
— patients
— lesions
— strains
If wide, at what age ?

a. *The risks*

1. Frequency

Geographical variations of seroprevalence exist between developing and developed countries. Among european populations, we observe some differences, for instance, 30% of young adults are seropositive for HP in Western Europ ; between 50 and 70% in Spain, more than 70% in Greece (5). Infection rate is quite different in the same country, depending on the origin of the family. We observe the same differences in Belgian statistics : among people attending the GI unit of the Brugmann Hospital in 1993, 43.1% of Belgian natives and 82.6% of Maghrebian were HP positive and among adolescents attending the diabetes Unit of the Children's Hospital (HUDERF) in 1996, 18% were *HP* seropositive : 11% of Belgian natives and 33% of Maghrebian ones (6).

2) Sero-epidemiological studies in adults show a cohort effect suggesting that primary acquisition occurs

in childhood. In countries of low prevalence the mean age of acquisition is higher. For instance, in Sweden, the mean age of contamination is 9-10 years, with a prevalence around 10% at 12 years, compared to the mean age of contamination of 2-4 years, with a prevalence of 100% at 12 years in Ethiopia (7). In developed countries, the incidence of infection is very low, around 2.7% per year in children in Finland (serology) (8), the same as in UK (^{13}C UBT) (9) and 0.3% per year in adult outpatients followed during 12 years in the Netherlands (10). Several studies, even in Europe, have found a higher incidence of infection in children less than 5 years of age, indicating a greater exposure or susceptibility to infection during childhood (11). The age of acquisition is of importance in the choice of a strategy and environmental factors are to be assessed around the age of seroconversion. In Belgium, a few studies in adults and children show differences in prevalence depending on age (12,13,14), but also on ethnic and socio-economic origin with 2 to 4 fold more risk in families from Maghrebian origin Table II).

2. Natural history

Natural history of the *HP* infection

Helicobacter pylori is an infectious disease acquired in childhood, often asymptomatic for a long period of time. But the silent evolution of gastric damage leads to risks for future severe pathologies that are not often predictable in an individual case. The purpose to treat this infection includes considerations on the natural outcome of the disease in the community : spontaneous cure, high risk of transmission or of severe complications.

Natural history of gastritis

— In a recent published study of the pediatric team of the CHU of Lille, a 2 years follow-up shows aggravations of the antral histological score (Sidney classification), without clinical complaints (15).

— Histology of gastric biopsies of 102 adult patients was studied during a period of 32 years (16). The disappearance rate of *HP* was 0.6% per patient-year and infection rate 0.4% per patient-year. Parietal cells antibodies appeared in 6 patients. Gastritis evolution was : disappearance of *HP*, normalization of antral lesions but atrophuy of the corpus. This low rate of elimination/acquisition of infection suggests that an eradication is worthwile for adults (17).

Reinfection rate

— Reinfection rate appears to be an unusual event occuring at the same rate as primary infection in the same population : 0.2 to 1%/year (18).

In children, a spontaneous eradication is possible as shown in Italy (19) and Peru (20). In Sweden such a natural seronegativation has been observed at the age of 11 years in 80% of previously positive children, not correlation to antibiotics consumption, peptic ulcers in parents, atopy, length of breast feeding, size of home and family, form of daycare, but correlated to unspecified abdominal pain during childhood ($p = 0.015$) (21). Reinfection rate after eradication is low among Spanish children during a short period of 12 months follow-up (2%), but in a study conducted in Ireland, *HP* reinfection occurs frequently within the 2 years after eradication among children under 5 years of age (66.6%) compared to 4% over 5 years. Appearance - reappearance of *HP* does not automaticaly mean reinfection. In adult patients controled by ^{14}C UBT, reinfection rate is less than 0.6%/year (22). It seems that the benefit of true eradication can be expected to

Table II. — **HP — Belgian epidemiology**

				HP prevalence (%)			
Influence of		**Population**	**Age (Y)**	**Total**	**Belg. nat**	**Im**	**Test**
Origin							
Cadranel	87	Σ Children	6.5	32	17	47	Culture
Burette	91	Σ Adults	50	57	48	85	Culture
Blecker	94	aΣ ped. pop.	6.7	7.5	5.5	19	Serology
Scaillon	97	Diab. adol.	18	18	11	33	Serology
Age							
Blecker	94	aΣ Children	1-5	6.2			Serology
		Adol.	16-20	16			Serology
		Mothers	36-40	31			Serology
Eurogast	93	aΣ adults	25-34	< 20			Serology
			55-64	> 50			Serology
Peeters	95	aΣ Children	6-12	4			^{13}C UBT
Group (Institution for neurohandicapped)							
Scaillon	93	Σ children	10	45			Culture
		Staff voluntiers	37	27			Serology
(11% Nursing, 20% Administration versus 65% Maintenance)							

persist for a long time and modelling of some data from USA and the UK suggest that most adults had been infected before the age of 15 years (23).

Evolution of gastric ulcers after classical treatment

In a randomized, controlled, multicentric, investigator blinded study it is concluded that HP is an important predictor of ulcus relapse, and that its eradication may heal peptic gastric disease (24) (table III).

Table III. — **Cure of gastric ulcer disease after cure of HP infection**

	Omeprazol 8 weeks	Bismuth 8 weeks + Ampi (2 × 0.85 gr) + Tini (2 × 1 gr) 10 days
Ulcus healed		
HP +	85.9%	81.8%
HP -	80%	16.7%
HP Negativated	8.1%	78.2%
Ulcus relapse	50%	4%
CONCLUSION : *HP is an important predictor of ulcus relapse, its eradication may heal ulcus gastric disease.*		

It is now admitted that pathogenic sequence of events leading to ulcer are linked to functional disturbances mainly due to interaction between 1) *HP* invasion and its peculiar virulence factors, 2) the host and its genetic or pathologic background, 3) the environmental cofactors (25). New treatments with H2 receptor antagonists or Proton Pump Inhibitors have increased the rate of healing in cases of gastric or duodenal ulcers. But except when NSAIDs are used or in case of Zollinger-Ellison syndrome, recurrence rate and bleeding relapses are associated to the presence of *HP.*

Natural history of gastric preneoplasic lesions after *HP* eradication

Altough clearance of infection results in long term improvement of inflammation, improvement of gastric atrophy or intestinal metaplasia is not warranted no more than the risk of cancer (26). We do not know the molecular basis of initiation of preneoplasic transformation and its reversibility during this year-long evolution of the Correa's cascade (Table IV).

3. SEVERITY

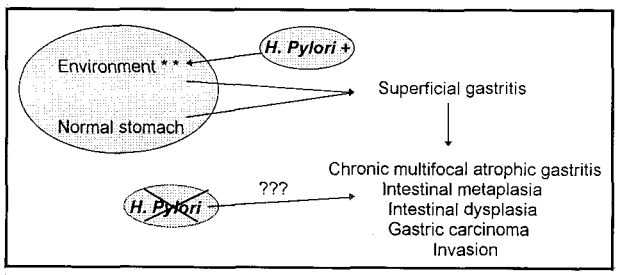
The severity of *HP* infection consequences about gastric malignancies, ulcers, non ulcer dyspepsia and influence of long standing chronic inflammation has already been discussed. In a screening strategy, the burden for society has also to be taken into account.

ABOUT CANCER

Individual

In Belgium, by extrapolation of the Dutch incidence (27), we can estimate 1.750 new cases of gastric cancer

Table IV. — **Correa model of gastric cancerogenesis**



(GC) per year. Survival after diagnosis is 50% in patients younger than 70 years (28). At the time of diagnosis, the gastric milieu will have undergone extensive changes and loss of *HP* colonization. Serology for *HP* was found positive in stored serum samples during the 1960s in 84% of patients who developed GC during follow-up and only in 61% of controls (odds ratio of 3.6) (29). These results in native americans have been confirmed in other studies with intermediate or high risk populations (30,31). Prospective studies suggest that *HP* infection increases the risk for atrophic gastritis and GC at least 3.8 to 8 fold (32). The risk is higher when infection occurs in early childhood, or with a cagA positive strain, or causes a decreased acid output (33).

Society

Gastric cancer (GC) is the second most diagnosed fatal cancer in the world (34). In Western Europe a decline in the incidence of gastric cancer has been observed during the last years, but gastric lymphoma (4-5% of all GC) as all non-Hodgkin lymphomas is arising and the understanding of this is still limited. The intestinal type of gastric adenocarcinoma and their preneoplasic lesions seem to be highly environmentally determined following the sequence discribed by Correa, some high risk populations are already known. The marked reduction in incidence of gastric cancer in the last 50 years seems related to changes in food storage and preparation more than any reduction in the incidence in HP infection (35). The knowledge of environmental factors including diet (nitrites, salt, low fibers, low vitamine C) intragastric factors (high pH, bile, bacterial overgrowth) or special ground (autoimmune pathologies) associated with relative higher risk of cancer tend to suggest the definition of some patient subgroups in whom gastric screening for early detection of cancer may be worthwhile (partial gastrectomies, atrophic gastritis, type III intestinal metaplasia). A systematic population-based screening for cancer by barium X-ray complemented by gastroscopy in people older than 40 years of age has been started with some benefit in the screened peoples in regions of Japan (36) and Venezuela, two high risk countries. But the real value of *population or selective screening* for cancer is not accuratelly assessed ; prognosis for gastric cancer is poor, any screening for early detection of gastric

cancer will lead to considerably saving lifes and no pharmacological intervention is currently proved to be able to reverse the lesions. *Screening for preneoplasic lesion* is more promissing. The European Cancer Prevention Intestinal Metaplasia Study should indicate (in 1999), if HP eradication and/or daily vitamin C supplements may stop or even revert intestinal metaplasia (37). *A strategy of screening HP infection in population of middle age* and treating those infected could cost, per life saved, as much as cervical cytology or breast mammographic screening. But, intervention after 50 years of age could be too late. Trials in high risk countries are more appropriate if we want to answer this question in less than 10 years (38,39).

About ulcers

Individual

One out of six patients with *HP* infection will develop either a gastric or a duodenal ulcer (40), a 3-4 fold higher risk than in non infected subjects. In absence of NSAID treatment, *HP* is associated in more than 95% of duodenal ulcers and 85% of gastric ulcers and in 5 fold more relapses at 1 year than observed after eradication (41,42). In a recent study recurrence of duodenal or gastric ulcer is completely prevented after *HP* eradication for up to 9.8 years follow-up (43).

Society

Asymptomatic adults with known factors of risk could be screened for ulcers. However, an italian study showed a high prevalence of ulcer in asymptomatic patients, whereas an american one reported only 2% of *HP* positive patients in this condition. Systematic endoscopic screening is not warranted (44,45). On the other hand, screening policy for *HP* infection in ulcers, followed by eradication therapy is clinically beneficial, but it is also economically cost-effective in terms of reducing the need of long-term acid supression, repeated medical consultation and further investigations or absences in this active portion of the population (46,47).

About non ulcer dyspepsia

It is often difficult to differentiate patients with gastritis, ulcer diathesis, gastroesophageal reflux and functional disorders. *HP* infection has been implicated in all these conditions. In this field, somatoform disorders are also possible. Bacterial infection can be diagnosed in the majority of gastritis and this inflammation disappears completely in 6 to 12 months after eradication therapy (48). This could stop the evolution towards more severe lesions. Oesophageal as duodenogastric reflux is implicated in therapeutic strategies. *HP* has a potential role in the development of reflux which influences the managment of the disease (49). There is no clear evidence that *HP* affects gastric emptying and sensations (50,51) nor proximal gastric compliance. Literature is controversal and no scientific answer is given to the question whether *HP* is implicated in functional dyspepsia. Pooled data of 18 studies suggest a rate difference of 23% and an odds ratio of 2.3 (95% Cl = 1.9-2.7 between HP positive dyspeptics and controls (52).

Cost effectiveness of screening dyspeptics for HP and eradicating is lower than initial endoscopy or empirical treatment. In the UK, were the prevalence of dyspeptics averages is 40%, more than one half takes medication and more than a fifth consults the general practitioner (53). Concerning British population of dyspeptic patients younger than 45 years, eradication treatment cost less than Cimetidine given as empirical treatment. When cost of identifying appropriated patients to receive eradication treatment is added (serology and if positive : endoscopy, checked by breath tests after treatment) cost saving takes 8 years to accrue (54).

Thus, *HP* eradication may lead to clinical improvement for some patients with upper gastrointestinal symptoms but non proven ulcers. But *HP* eradication therapy is not universally admitted in this indication and most of the studies are clouded by methodological problems. Large, randomized and controlled studies are awaited in this field of high placebo response rate.

Two strategies are discussed in terms of cost of investigations and of treatments, but give raise to other discussions.

— Do we investigate all young adults complaining of upper gastrointestinal symptoms in order to select out a few patients with ulcer ? Or do we treat the symptoms by antibiotics to heal a non proven ulcer ? A positive response of 5-10% of all HP positive dyspeptic patients to eradication will make this option beneficial (55). But this study does not take subsequent problems into account as sides effects of treatment, resistances induction, cost of search for help of screened, even treated but not cured patients.

— In a strategy of Hp screening for young patients under 45 years, do we miss important diagnosis ?

In a study of patients < 25 years with upper GI symptoms, 47% had abnormal endoscopy with DU (91% *HP* positive) and GU (50% *HP* positive), non ulcers were *HP* positive at a higher rate than normal population (29.8%) (56). Malignancy rarely presents with dyspepsia without associated alarming symptoms under 55 year of age, although when it does it is usually incurable (57).

On the economic point of view, retrospective (58) and prospective (59) studies have provided evidence to the cost effectiveness of screening for and eradication of *HP* infection. By testing non invasivelly *HP* status of young dyspeptic patients (< 45 year old) and eradicating all positives, substantial benefits are made in the field of investigations (mainly endoscopic workload) and therapies (60). The studies about HP implication in recurrent abdominal pain in childhood are still controversal (61,62).

OTHER CONDITIONS

Extradigestive diseases are indirectly suggested to be correlated with HP infection acting probably via circulating inflammatory modulators : in young patients, reduced stature and influence on nutritional status and puberty, later in life : vascular and coronary heart disease, but also autoimmune and other diseases, are advocated. Impact of screening and eradication can be only speculated.

b. *The tools*

FOR SCREENING (see previous lectures)

Screening techniques must be non invasive, and unexpensive. All models presuppose 100% sensitivity and specificity, but this is not the case. As diagnostic tool, serology seems to be the first choice. The need of follow-up testing depends on the efficacy of the treatment chosen and on the reinfection rate in the population. Since antibodies titers take at least 6 months to fall following eradication, urea breath test could be the best choice for short term follow-up. For general screening, tests are being developed, the whole blood "office or doctor tests" are not as accurate as laboratoty tests. Serological test for cagA antibodies and immunoblot test, PCR/DNA enzyme immunoessay seem promissing (63). If the importance of the risk is admitted and the cost-benefit evaluations are credible, we have to define the aim of the screenings : 1) decrease infection rate, 2) avoid special morbidity, 3) survey population at risk or infected people, 4) eradicate asymptomatic or symptomatic infection.

The tools could be very different in each case. In the first case, PCR could be needed to recognizes environmental risk and identify modes of transmission. In the second one molecular-based techniques, currently used for research in pathogenesis, could be able to determine disease associated strains from others. In the third and fourth ones, two non invasive techniques of high level of specificity and sensitivity are available. The cost of serology makes it more attractive compared with the ^{13}C UBT, but the latter, is the only one useful within the time proposed to test eradication.

FOR TREATMENT (see previous lectures)

The current treatments are not always effective, need patient's compliance and are not devoid of resistance to the antibiotics included in all regimes. As for screaning, it must be optimal to respect the modellings, cheap and well tolerated. In order to avoid ecological disturbances, observatories for efficacy and resistances would be organized. A follow-up is mandatory since eradication is not warranted (failure of therapy), and reinfection is possible (lack of long-term immunity).

ALTERNATIVES

Action on environmental factors

— Before any effort of screening for infection on patients, we should understand the infection's routes in person to person contacts. New informations on the mode of transmission of *HP*, oro-oral or feaco-oral but possibly through foods and environmental sources as untreated drinking water (64) would facilitate the prevention of the disease acting on the everlasting health problem of hygiene. Zoonotic (or anthroponotic) transmission of *HP* is controversal (65,66). Occupational risks for endoscopist and iatrogenic risks for patients have been identified in some studies and better guidelines for workers are useful (67).
— Another public health goal could be the interventions on environmental factors associated with higher risk of complications, as GC.

Vaccination

The policy of widespread eradication of *HP* will probably rely on prophylactic and therapeutic vaccination. When it is available, the choice of a strategy of prophylaxy will be guided by problems of cost, efficacy against all strains or of the length of protection. And, at that time, the screening will even be avoided as the vaccin will be able to cure and to protect after oral ingestion (68,69). It seems that vaccin will take an other 5-10 years to develop and 50 years more to evaluate efficacy on morbidity (70). Several *HP* proteins (as urease) in combination with a safe mucosal adjuvant are potential vaccine candidates.

c. *The targets*

If we accept that we do not test unless we are willing to eradicate, the question is :
Do we screen and, subsequently, treat *HP* infection a) only when consequences of the infection are present or b) only when some conditions increase the risks of severe evolution of the infection or c) each time infection is discovered ?

SCREENING FOR SPECIAL CONDITIONS

— In developed countries reinfection is uncommon after succesful treatment in adults, although data do not currently support treatment for non-ulcer dyspepsia or for prevention of gastric cancer. Nevertheless, categories of patients could benefit from such treatments and are to be defined. Currently, we need to propose situations in which *HP* screening and thereafter eradication are accepted or strongly advised. Following the conclusions of Maastricht's consensus and perspectives of Pr B.J. Marchall (2,70) we can summarize the indications for eradication therapy and thus for previous screening of *HP* infection as follow (table V). Treatment

Table V. — **Indications for research of Helicobacter infection and eradication therapy**

Indication	Eradication	Comments
Ulcer disease (G or D)		
bleeding	YES	Strongly recommended, unequivocally
active	YES	Strongly recommended, unequivocally
inactive	YES	Strongly recommended, unequivocally
after surgery for	YES	Strongly recommended, supportive evidences
Before NSAID therapy	YES	Even without past ulcer history. Advisable, equivocal supportive evidences
Proton pump inhibitor	YES	Long term therapy for GER and HP increase risk of atrophy. Advisable, supportive evidences
Gastritis		
atrophic	YES	Strongly recommended, supportive evidences
int. metaplasia	YES	Strongly recommended, supportive evidences
MALT lymphoma	YES	When lymphoma is confined to the stomach and low grade, eradication therapy is strongly recommended, unequivocally and cures 50% of patients
Gastric adenocarcinoma	YES	When curative resection of lesion is performed Strongly recommended, supportive evidences
Non-ulcer dyspepsia	?	Even after full investigation, benefit has not been proven. Advisable, optional
Family history of gastric AC	?	Implies genetic risk and exposure to same HP strain. Advisable, equivocal to recommended regardless of symptoms
Extra-digestive tract diseases	??	Relation uncertain, equivocal supporting evidences
Coronary art. dis.		
Rosacea		
Halitosis	??	Relation uncertain, HP therapy is also active on anaerobes of periodontal and oropharyngeal diseases
Incidental HP	???	If diagnosed, the infection will probably be treated !

of *HP* positive, first degree relatives, of patients with gastric cancer has been recommended with even a potential medicolegal implication if this approach was not followed (71). But data do not currently support treatment for prevention of gastric cancer. Some categories of asymptomatic subjects, may amplify the infectivity of *HP* in their surrounding or be at risk of troubles, complicating the course of a chronic illness. Higher rates of infections are recognized in close communities and for their care givers. This choice is problematic and takes a sight on for instance : immigrants, adopted children, confined communities, pathologic background as dialysis, diabetes, transplant. In a non controlled study, performed in an institution for neurologically heavily impaired children, we have found *HP* infection in 45% of the patients (mean age 10 years) investigated for vomiting, anorexia, signs of pain especially during postprandial periods or respiratory recurrent troubles with gastro-oesophageal reflux. That raises the question of a screening, in this population unable to express clearly its pain and very easily infected (72).

Studies suggest that marital status is a risk factor for infection in adulthood. Among 64 spouses of patients with duodenal ulcers, 78% of spouses of *HP* positive patients are also positive, but only 20% of spouses of *HP* negatives patients were *HP* positive. Ribopatterns of *HP* strains derived from 18 couples was the same in 8 couples (73). If intrafamilial spread of *HP* is an important mode of acquisition in childhood (74), the familial risk is influenced by genetic factors (75) but also by environmental factors and common sources of contamination operating in childhood and early adulthood (76). Within any country, of low or high prevalence, the rate of infection during infancy is much higher than during adulthood, suggesting that *HP* is either more readily transmitted during childhood or that children are more susceptible to *HP* infection. Many living conditions in childhood are evoked as risk factors : socio-economic conditions, bed sharing, overcrowding. Familial clustering has been demonstrated with molecular analysis, although this confirms that close contacts is an important factor for intra-familial transmission, parent to child (77) or the contrary (78), it does not exclude a common external environmental source. These findings are important to develop preventive strategies as it appears little reason for treating systematically an entire family to prevent reinfection. Indeed, some authors suggest to screen the family, each time reinfection is observed.

If we want to select patients at risk, which characteristics could be screened : host-related, gastric lesions-related, *HP* strains-related ?

Screening host-related

A biomarker strategy for detection of asymptomatic individuals with gastric atrophy has been suggested using serum pepsinogen level and *HP* serology (79). Le(a+b-) phenotype and ABH non-secretor trait seem to be relevant genetic markers of peptic ulcers in a Danish population (80).

Screening lesion-related

Genetic variability in host chemokine responses may contribute to disease outcome (81).

Screening for peculiar strains

Molecular studies are being conducted to indentify virulence factors and genetic relatedness of *HP* strains to correlate them with gastrointestinal disease. Disease associated genotypic markers of *HP* varie significantly between geographic regions. If PCR is not an essential tool for diagnosis, it is able to detect low number of organisms outside the stomach. It could give new information about transmission. REP-PCR can also give new light on pathogenicity of some *HP* (82). New progress in the knowledge of the complete genome sequence of *HP* would provide a basis for indentification of individuals at high risk when infected by particular pathogenic strains and for selection of patients to be eradicated (83).

Age for screening

The knowledge of the infection and reinfection risk and the aim of this screening seem important to determine the right age and the extend of the population to screen. Reinfection is virtually absent after eradication in an adult Western population (84). The well-illustrated cohort effect on prevalence, orders different strategies perhaps depending on age. It can be speculated that birth-cohort born in 1975 in Finland, currently infected in more or less 15%, will present a prevalence of 25% after 70 years compared to 40% for those born in 1945 and 75% for thos born in 1915 (85). As a decrease in the prevalence of *HP* gastritis is associated with an exponential decrease in the incidence of cancer and ulcers (86) with time, *HP* infection would be no more a health care issue in Finland, even without any screening ! Screening strategies could be focused on asymptomatic adolescents, with low rate of infection and low risk of reinfection, on symptomatic adults, or on all 50 year old persons. Screening of the 15 years old Belgian adolecents (125.256 persons) by serology and treatment of seropositves with a triple therapy (OAC) would cost around 90.10^6 Belgian francs, but long term impact on health and economy depends on uncontrolled features as compliance of the healthy adolescents and socio economic evolution. The two other propositions agreed with the economic models proposed in the litterature about ulcer diseases or cancer.

Conclusions

In symptomatic patients, screening means diagnosis. In asymptomatic population, screening means making public health decisions.

An important world public health priority for the future will be to evaluate the impact of *HP* control on the incidence of gastric cancer, whether by primary prevention, eradication or vaccination. More studies are needed on transmission, natural history of the infection, reliability of screening, cost-efficacy of treatment and long-term implication as well as modification of epidemiology. Due to the decline of *HP* infection rate, we can postulate that ulcers and cancers will become more and more infrequent with time and that a screening attitude decided now, will be obsolete regarding growing generations. Depending on the health care policy and therapeutic tools used, screening could be wide or selective. With prophylactic vaccination of newborns, screening will be useless. In our country of low increase of prevalence and of low reinfection rate, systematic screening, followed by eradication for infected groups can be discussed. Screening of teenagers or young adults could be effective, with impact on quality of life and avoidance of the permanent, local and general, injuries of the chronically inflammated gastric mucosa.

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